AD-A101 988 ARMY ENGINEER DISTRICT PHILADELPHIA PA F/G 8/8
FLOOD PLAIN INFORMATION, SHABAKUNK CREEK, WEST BRANCH SHABAKUNK--ETC(U)
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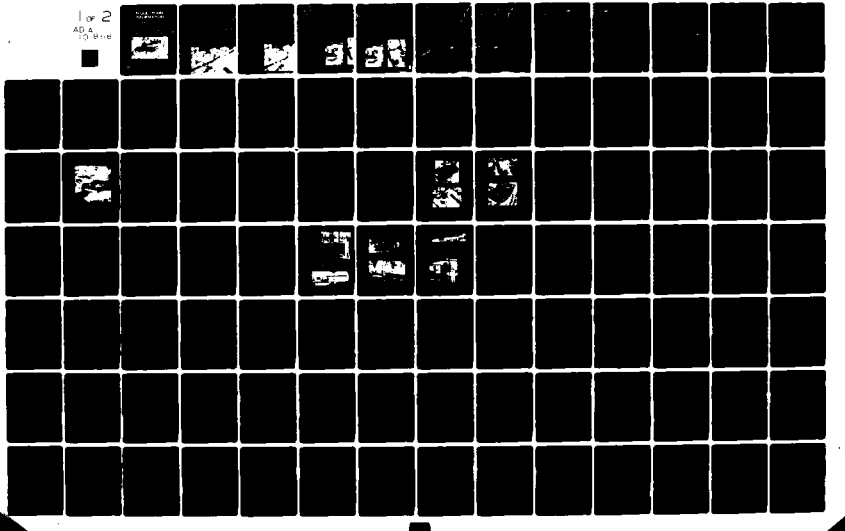


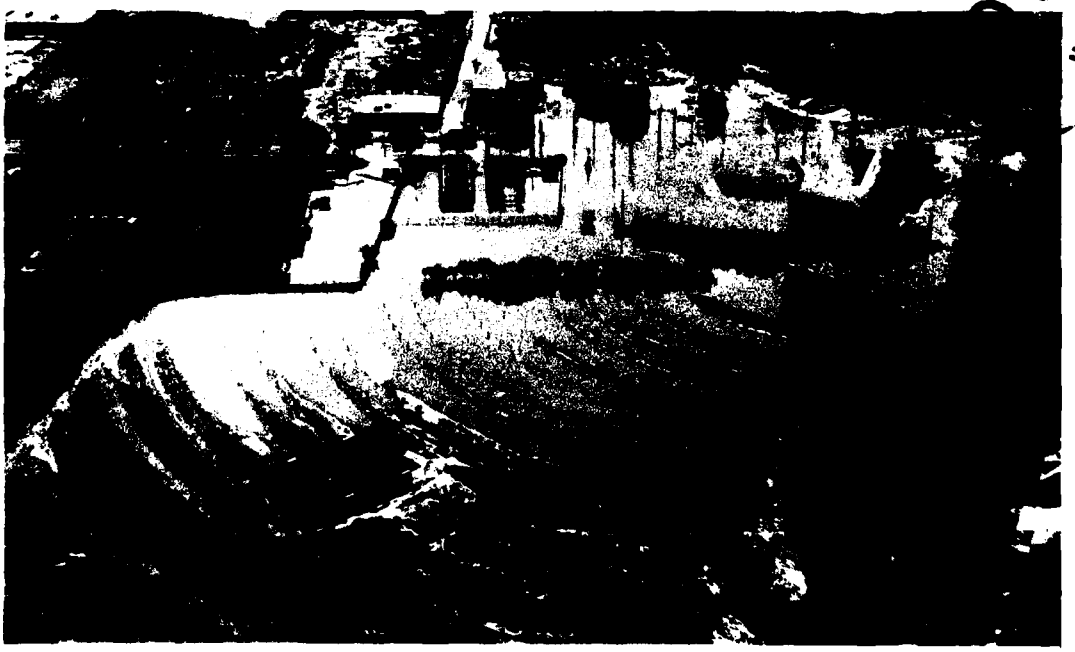
LEVEL II

FLOOD PLAIN INFORMATION

(1)

SHABAKUNK CREEK

WEST BRANCH SHABAKUNK AND LITTLE SHABAKUNK CREEKS MERCER COUNTY, NEW JERSEY



PREPARED FOR THE MERCER COUNTY PLANNING BOARD AND THE NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION BY THE DEPT. OF THE ARMY, PHILADELPHIA DISTRICT, CORPS OF ENGINEERS, PHILADELPHIA, PA.

REPT NO: DAEN/NAP-82040/FPI40-73/10

*Original contains color plates: All DTIC reproductions will be in black and

OCTOBER 1973

FLOODS

This folder is an announcement of and supplement to the "Flood Plain Information (FPI) Report, Shabakunk Creek, West Branch Shabakunk Creek, and Little Shabakunk Creek, Mercer County, New Jersey." The report has been prepared to emphasize the importance of flood potential and flood hazards in land use planning and to

PAST AND POSSIBLE FUTURE FLOOD HEIGHTS ON SHABAKUNK CREEK

Elevation—Feet, Mean Sea Level Datum

Location	Flood of Aug. 28-29, 1971	N.J. Floodway Design Flood (100-Yr.)	N.J. Flo[od] Hazard A[rea] Design Flood
Green Lane	84.1	83.3	83.9
Ewingville Rd.	97.3	94.2	95.0
Bull Run Rd.	113.2	112.1	11[illegible]

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Inside are sketches illustrating the horizontal and vertical relationships of flooded areas and a flood area map from the report showing the extent of the Floodway Design Flood (FDF), Flood Hazard Area Design Flood (FHADF), and the Standard Project Flood (SPF) in a portion of the study area.

This folder has been prepared for the Mercer County Planning Board by the U.S. Army Corps of Engineers from data in the report "Flood Plain Information, Shabakunk Creek, West Branch Shabakunk Creek, and Little Shabakunk Creek, Mercer County, New Jersey." Copies of the report and this folder are available upon request from the Mercer County Planning Board, P.O. Box 1777, Trenton, New Jersey 08607.

FLOODS on SHABAKUNK CREEK,

WEST BRANCH SHABAKUNK CREEK AND LITTLE SHABAKUNK CREEK

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Elevation—Feet, Mean Sea Level Datum

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Green Lane	84.1	83.3	83.9	85.9

ACTION is needed

The flood plains of Shabakunk Creek, West Branch Shabakunk Creek and Little Shabakunk Creek are extensively developed. Additional residential and commercial development is occurring presently and can be expected to increase in the future. The devastating effects of flooding will be even greater unless action is taken.

Effective regulatory measures such as zoning ordinances and building codes can be designed to prevent increased flood damages. Flood proofing can reduce potential damages to properties already subject to flooding, and additional works to modify flooding can also be a part of the long-run solution.

The communities along Shabakunk Creek, West Branch Shabakunk Creek, and Little Shabakunk Creek are not the only ones with flooding problems. Flood plain information has already been provided for many of several thousand flood-plagued communities. Nearly 600 of those having FPI Reports by mid 1972 have adopted or strengthened regulations, while 760 others have them under study. A total of 1,360 communities have used the FPI Reports in planning land use control.

Inside are sketches illustrating the horizontal and vertical relationships of flooded areas and a flood area map from the report showing the extent of the Floodway Design Flood (FDF), Flood Hazard Area Design Flood (FHADF), and the Standard Project Flood (SPF) in a portion of the study area.

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FLOODS

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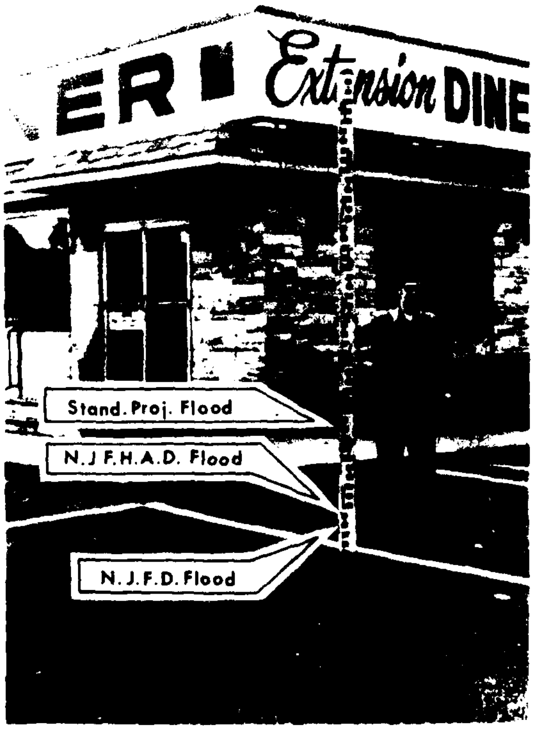
Although Ewing Township, Lawrence Township, and other communities along Shabakunk, West Branch Shabakunk, and Little Shabakunk Creeks have suffered extensive damage from past floods, studies indicate that even larger floods can occur in the future. Emphasis is given to future floods in the FPI Report. Maps, profiles, and cross sections have been included to illustrate the possible extent and severity of future floods.

Included in this folder are photographs showing possible future flood heights at selected locations. The flood height shown for a large flood, the New Jersey Floodway Design Flood (NJFDF), is one that occurs once in 100 years on the average, although it could occur in any year. Also indicated is the flood height that would be reached if a very large, Standard Project Flood (SPF), should occur. The Standard Project Flood represents a reasonable upper limit of expected flooding in the study area.

PAST AND POSSIBLE FUTURE FLOOD HEIGHTS
SHABAKUNK CREEK
Elevation—Feet, Mean Sea Level Datum

Location	Flood of Aug. 28-29, 1971	N.J. Floodway Design Flood (100-Yr.)
Green Lane	84.1	83.3
Ewingville Rd.	97.3	94.2
Bull Run Rd.	113.2	112.1



Future flood heights on West Branch Shabakunk Creek near Parkside Ave.

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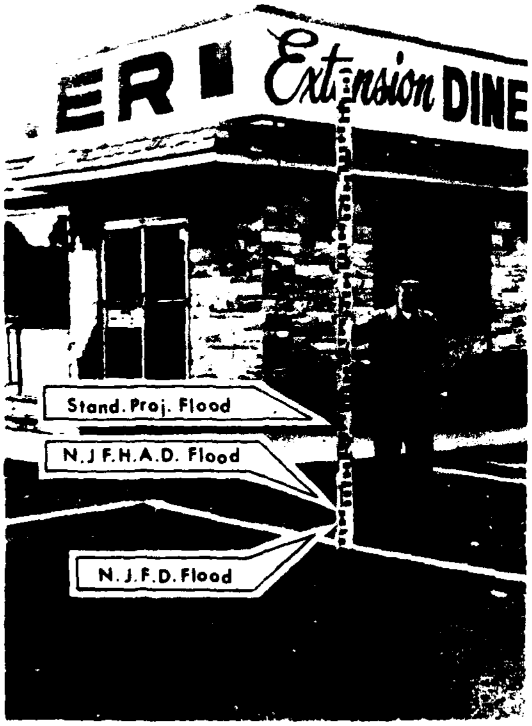
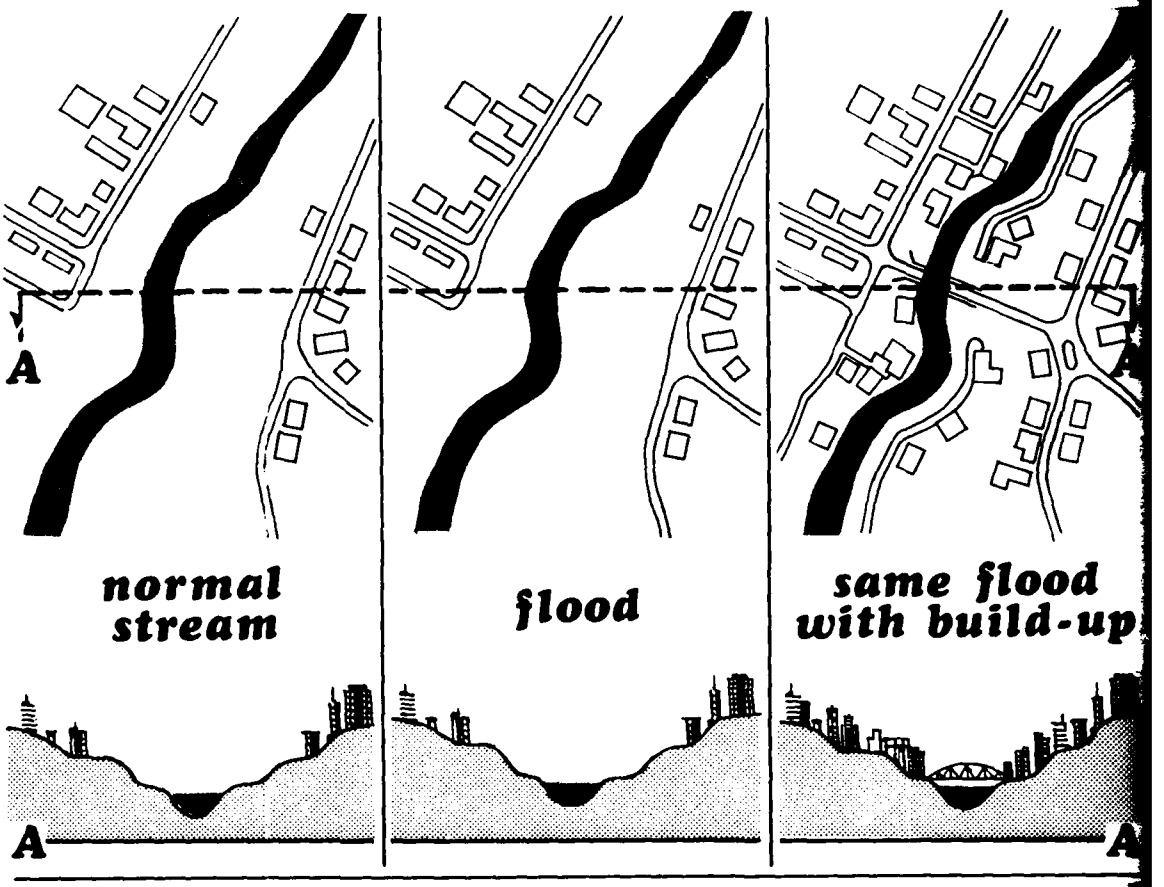
Ewingville Rd.	97.3	94.2	95.0	97.7
Bull Run Rd.	113.2	112.1	113.0	114.4



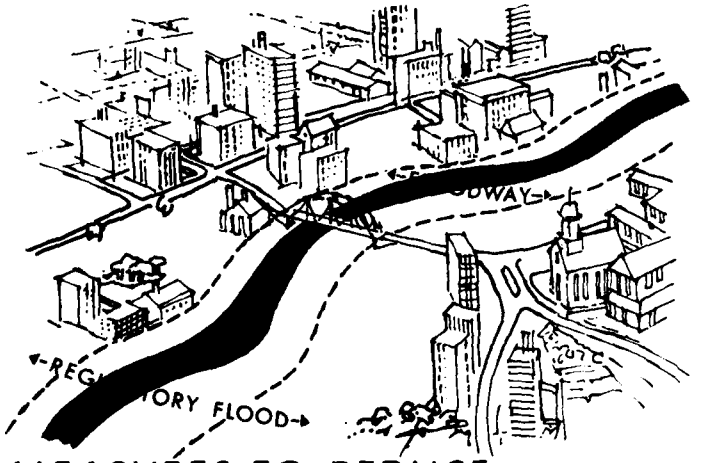
Future flood heights on West Branch Shabakunk Creek near Parkside Ave.

West branch Shabakunk Creek at Olden Ave. and Arctic Parkway looking downstream

BUILDING in the FLOOD PLAIN can make FLOODS WIDER and DEEPER



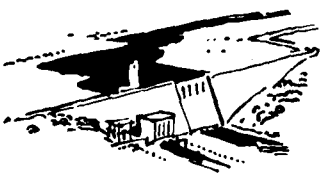
TOOLS of FLOOD PLAIN MANAGEMENT for the reduction of Flood Damage



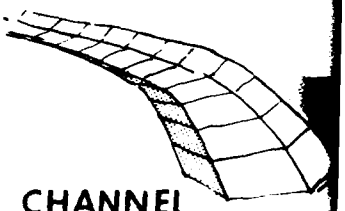
MEASURES TO REDUCE *VULNERABILITY TO FLOODS* *provide for a future with more freedom from flood damage, often at minor cost and with little adverse effect on the environment* . . . . . .

REGULATIONS
(ZONING, BUILDING CODES, SUBDIVISION)
• FLOOD PROOFING • RELOCATIONS •
• URBAN RENEWAL •

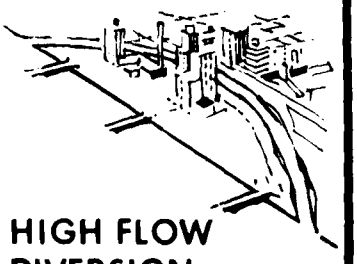
MEASURES TO MODIFY FLOODS
are often required to alleviate existing problems and sometimes to forestall future problems . . .



DAMS & RESERVOIRS

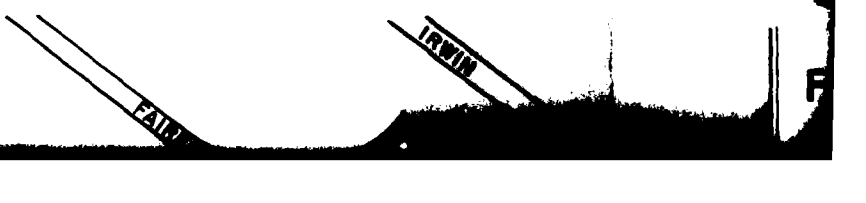


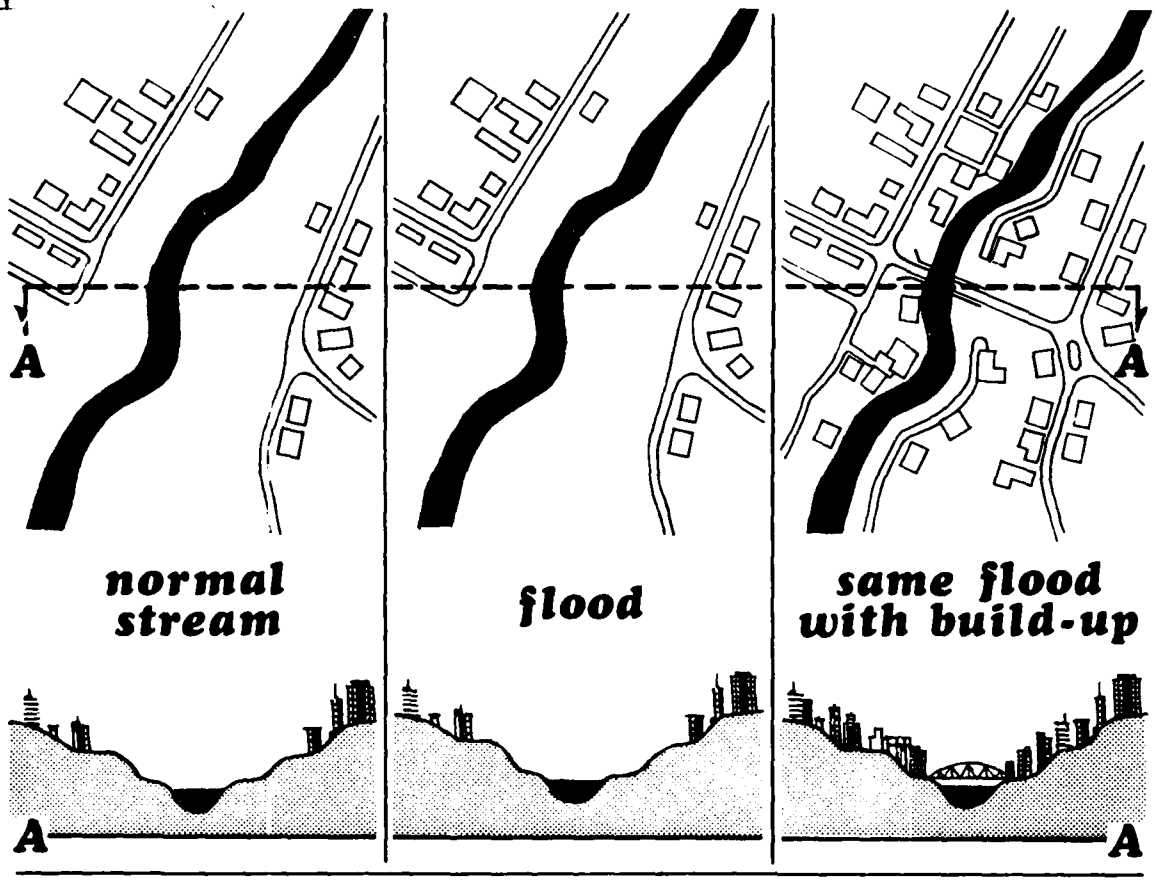
CHANNEL ENLARGEMENT



HIGH FLOW DIVERSION

LEVEES





this ENCROACHMENT can change a Small Flood into a MAJOR FLOOD

OOD PLAIN MANAGEMENT for the reduction of Flood Damage and Human Suffering

REDUCE *VULNERABILITY*
for a future with more freedom
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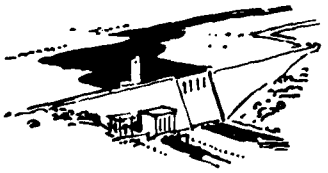

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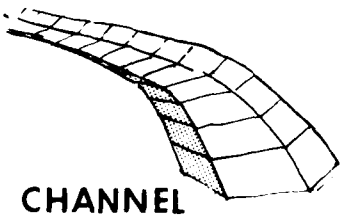

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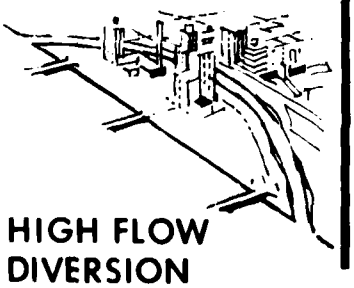

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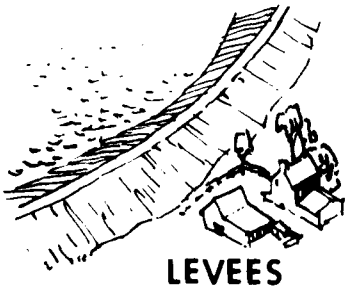


LEVEES

OTHER MEASURES

aid the Flood Plain occupant in coping with floods . . .

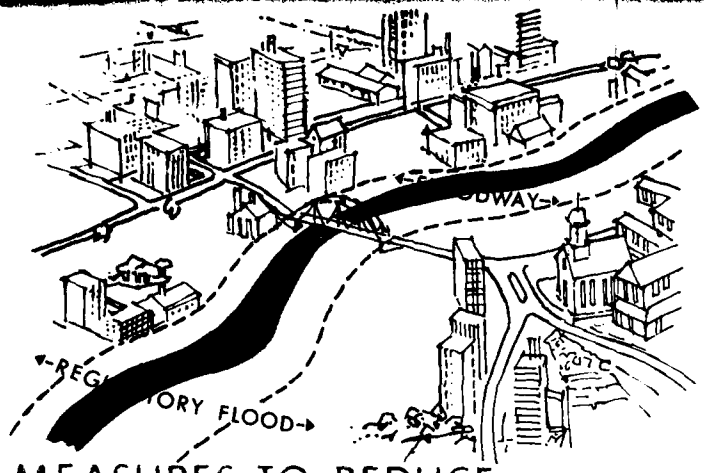
EDUCATION

TAX ADJUSTMENTS

FLOOD INSURANCE

WARNING & EMERGENCY PLANS

FLOOD PATTERNS
FOR SHABAKUNK CREEK



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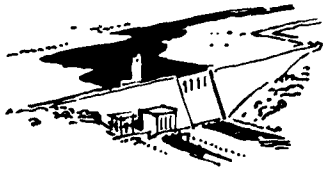

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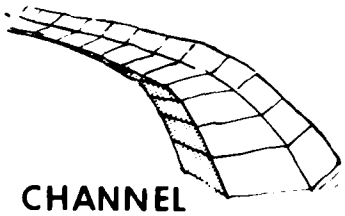

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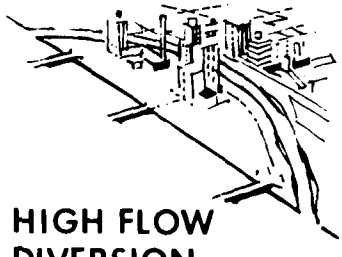

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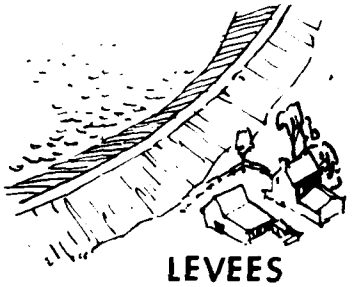

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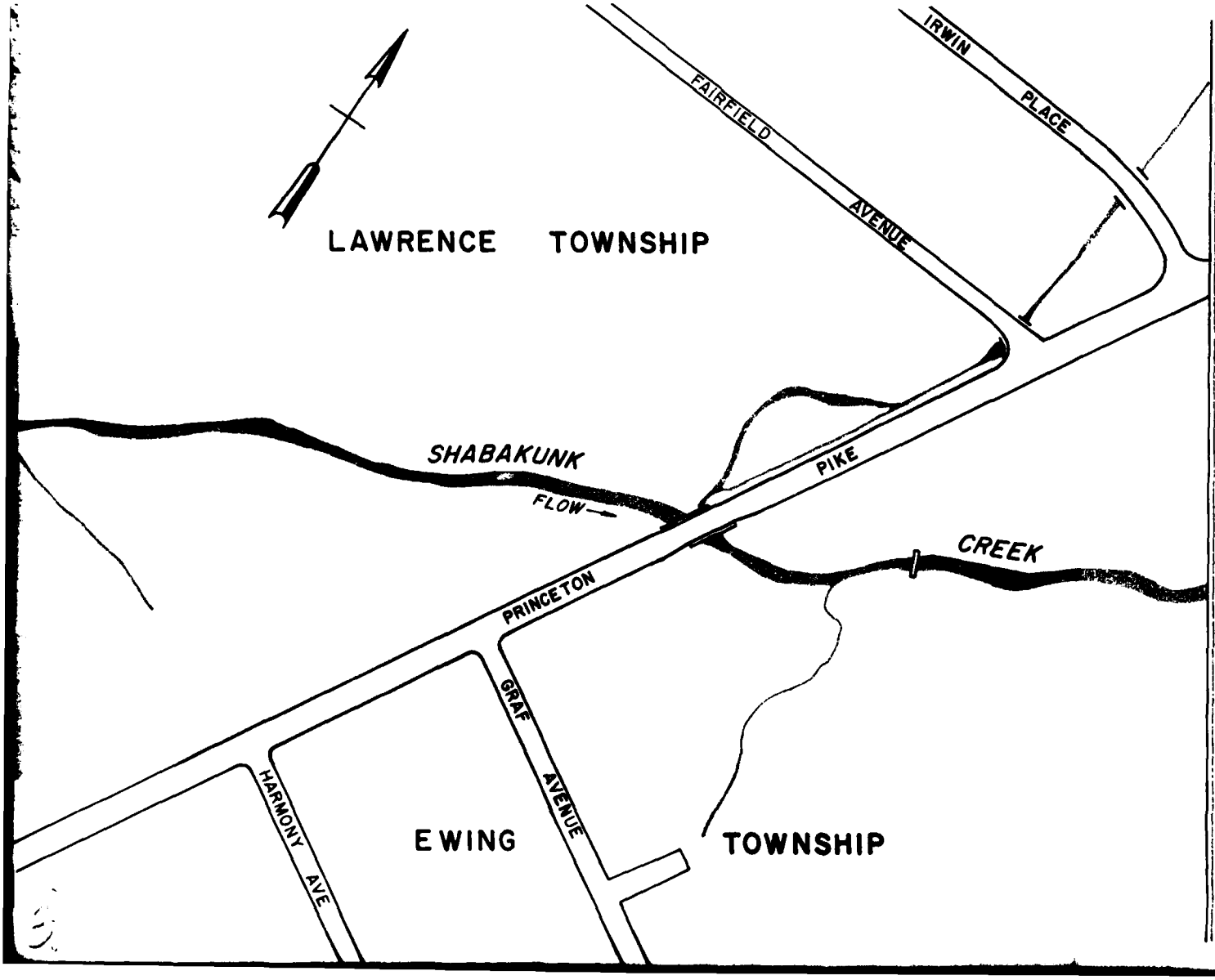

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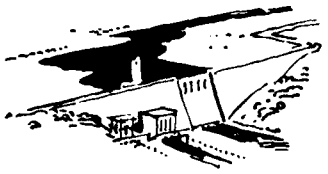

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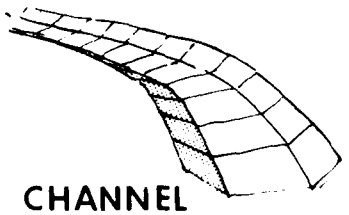

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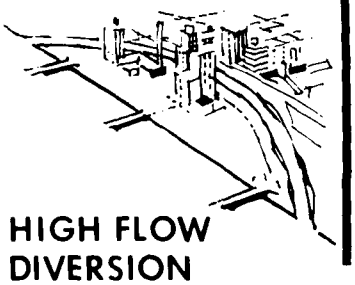

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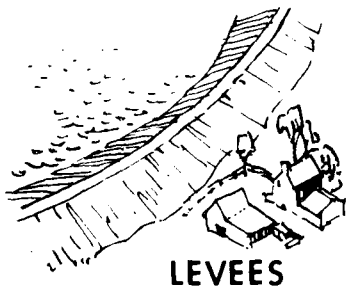

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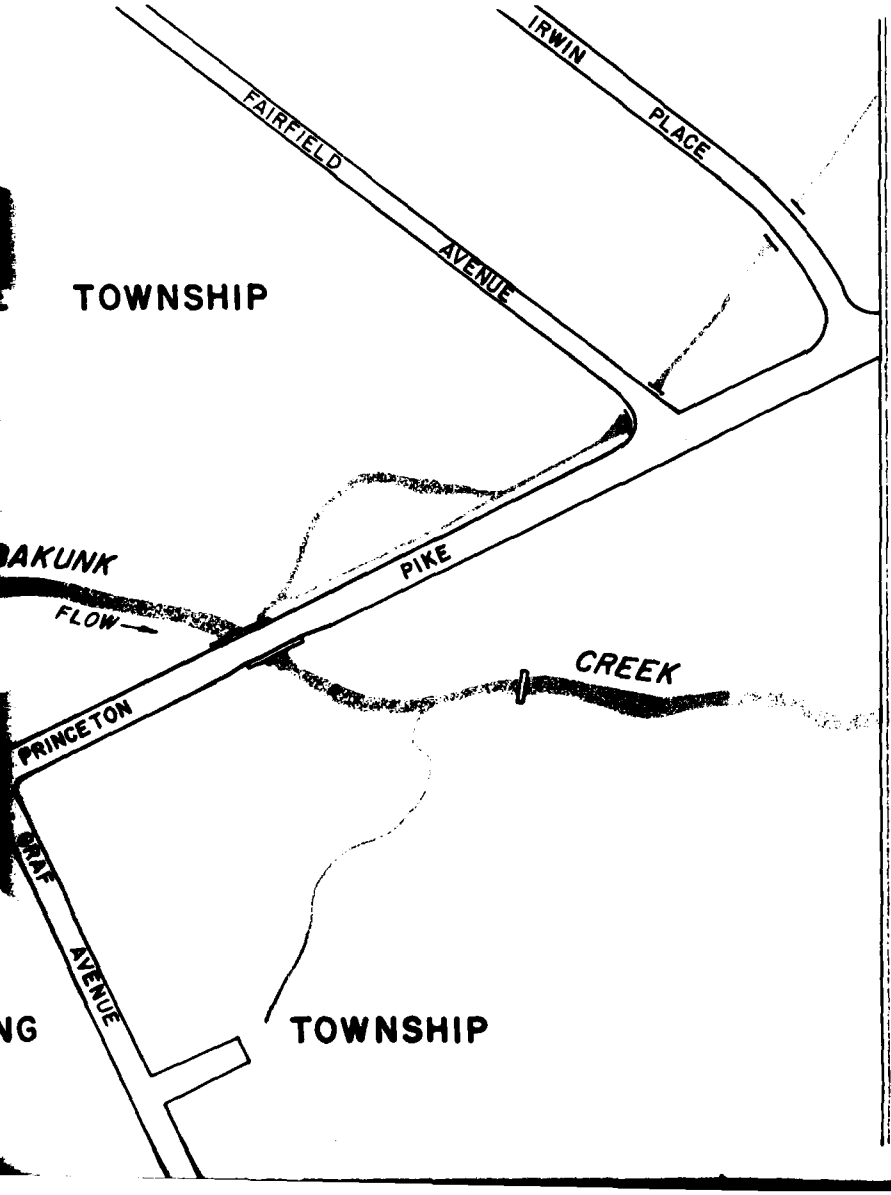

FLOOD PATTERNS
FOR SHABAKUNK CREEK
NEW JERSEY

LEGEND

approximate limits of overflow

NORMAL STREAM

N.J. FLOODWAY DESIGN FLOOD (NJFDF)

STANDARD PROJECT FLOOD (SPF)

PROFILES in the *Flood Plain Information Report* show elevations of these floods for the entire study area

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER: DAEN/NAP-82040/FPI40-73/10	2. GOVT ACCESSION NO.: AD-A101 988
3. RECIPIENT'S CATALOG NUMBER:	
4. TITLE *(and Subtitle)*: Flood plain information, Shabakunk Creek, West Branch Shabakunk and Little Shabakunk Creeks, Mercer County, New Jersey	5. TYPE OF REPORT & PERIOD COVERED: Flood plain information
	6. PERFORMING ORG. REPORT NUMBER: DAEN/NAP-82040/FPI40-73/10
7. AUTHOR(s):	8. CONTRACT OR GRANT NUMBER(s):
9. PERFORMING ORGANIZATION NAME AND ADDRESS: U.S. Army Engineer District Philadelphia, 2nd & Chestnut Sts., Philadelphia, PA 19106	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS:
11. CONTROLLING OFFICE NAME AND ADDRESS: U.S. Army Engineer District Philadelphia, 2nd & Chestnut Sts., Philadelphia, PA 19106	12. REPORT DATE: Oct. 1973 13. NUMBER OF PAGES: 65
14. MONITORING AGENCY NAME & ADDRESS *(if different from Controlling Office)*:	15. SECURITY CLASS. *(of this report)*: UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE:

16. DISTRIBUTION STATEMENT *(of this Report)*

APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED.

ELECTE JUL 24 1981 D

17. DISTRIBUTION STATEMENT *(of the abstract entered in Block 20, if different from Report)*

18. SUPPLEMENTARY NOTES

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

Shabakunk Creek, NJ
Mercer County, NJ
Little Shabakunk Creek, NJ
Mercery County Planning Board
N.J. Dept. of Environmental Protection
Floods
Flood forecasting
Flood plains

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

The portion of Mercer County covered by this report is subject to flooding by Shabakunk Creek, West Branch Shabakunk Creek and Little Shabakunk Creek all of which are tributaries to Assunpink Creek, NJ. These areas were severly damaged by floods in 1938, 1955, 1967 and 1971. A description of the history of flooding along Assunpink Creek and its tributaries was presented with special emphasis also given thru maps, photographs, profiles and cross section for determination of the possible effects of future floods.

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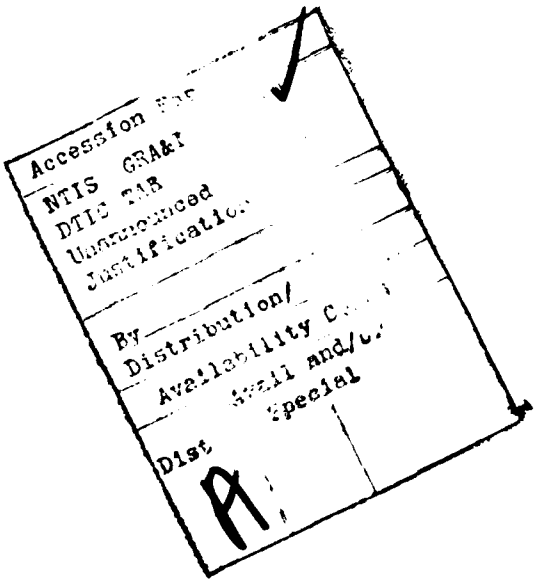
SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

Under authority of Section 206 of the 1960 Flood Control Act as amended the flood plain information was prepared by the U.S. Army Corps of Engineers Philadelphia District at the request of the Mercer County Planning Board and the New Jersey Department of Environmental Protection. The information should be considered for its historical nature. Since the publication of this FPI report other Flood Insurance studies have been undertaken and should also be consulted for more current information.



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TO THE REQUESTOR:

This Flood Plain Information (FPI) Report was prepared by the Philadelphia District office of the U.S. Army Corps of Engineers, under the continuing authority of the 1960 Flood Control Act, as amended. The report contains valuable background information, discussion of flood characteristics and historical flood data for the study area. The report also presents through tables, profiles, maps and text, the results of engineering studies to determine the possible magnitude and extent of future floods, because knowledge of flood potential and flood hazards is important in land use planning and for management decisions concerning floodplain utilization. These projections of possible flood events and their frequency of occurrence were based on conditions in the study area at the time the report was prepared.

Since the publication of this FPI Report, other engineering studies or reports may have been published for the area. Among these are Flood Insurance Studies prepared by the Federal Insurance Administration of the Federal Emergency Management Agency, Flood Insurance Studies generally provide different types of flood hazard data (including information pertinent to setting flood insurance rates) and different types of floodplain mapping for regulatory purposes and in some cases provide updated technical data based on recent flood events or changes in the study area that may have occurred since the publication of this report.

It is strongly suggested that, where available, Flood Insurance Studies and other sources of flood hazard data be sought out for the additional, and, in some cases, updated flood plain information which they might provide. Should you have any questions concerning the preparation of, or data contained in this FPI Report, please contact:

U.S. Army Corps of Engineers
Philadelphia District
Custom House, 2nd and Chestnut Streets
Philadelphia, PA 19106

ATTN: Flood Plain Mgt. Services Branch, NAPEN-M

Telephone number: (215) 597-4807

CONTENTS

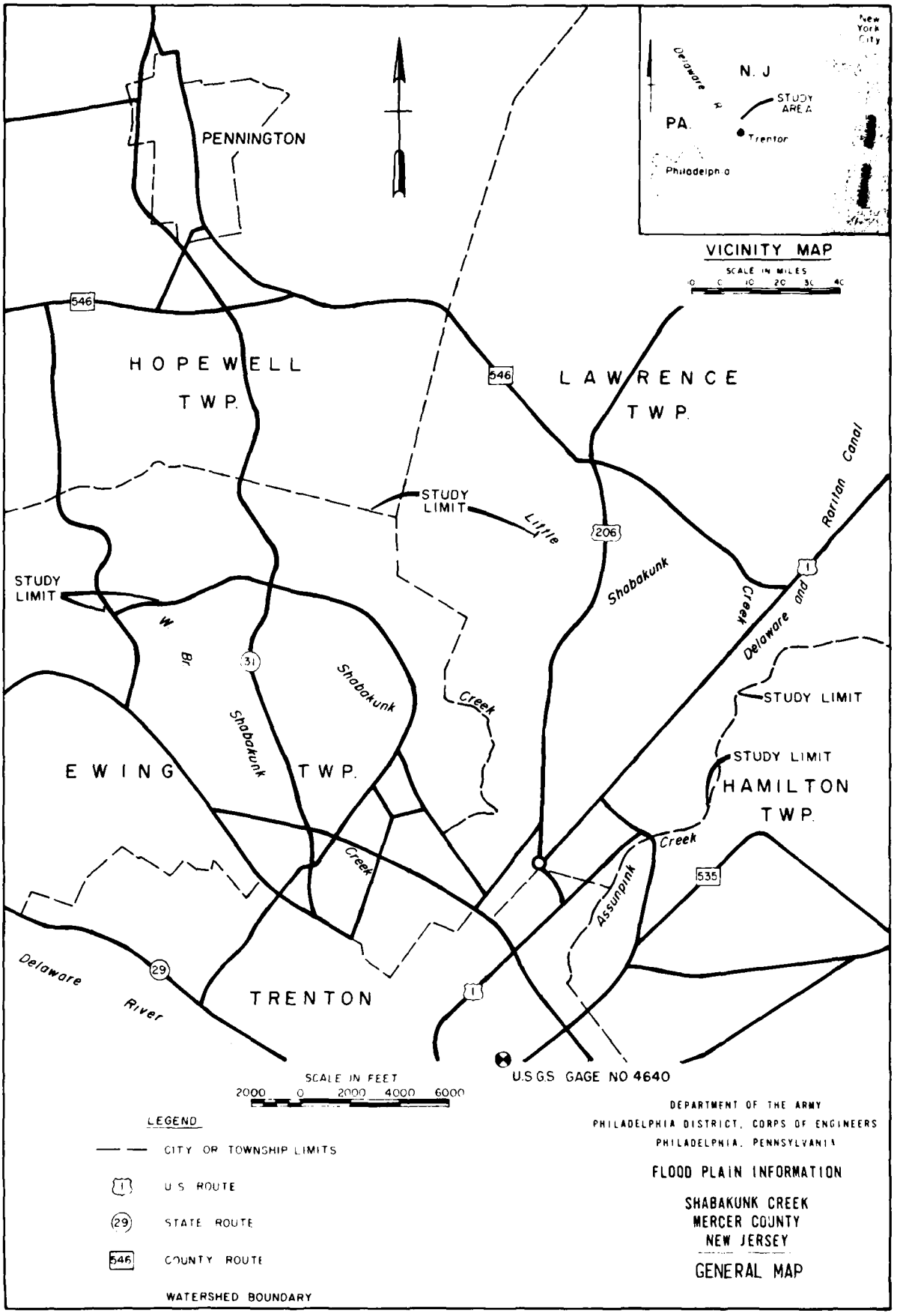
CONTENTS (Continued)

TABLES

CONTENTS (Continued)

PLATES

FIGURES


PENNINGTON
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LAWRENCE TWP.
EWING TWP.
TRENTON
HAMILTON TWP.
546
546
206
31
29
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535
STUDY LIMIT
STUDY LIMIT
STUDY LIMIT
STUDY LIMIT
Little Shabakunk Creek
Shabakunk Creek
W Br Shabakunk Creek
Assunpink Creek
Delaware and Raritan Canal
Delaware River
U.S.G.S. GAGE NO 4640
SCALE IN FEET
2000 0 2000 4000 6000
LEGEND
CITY OR TOWNSHIP LIMITS
U.S. ROUTE
STATE ROUTE
COUNTY ROUTE
WATERSHED BOUNDARY
VICINITY MAP
SCALE IN MILES
10 0 10 20 30 40
New York City
Delaware R.
N. J.
PA.
STUDY AREA
Trenton
Philadelphia
DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA
FLOOD PLAIN INFORMATION
SHABAKUNK CREEK
MERCER COUNTY
NEW JERSEY
GENERAL MAP

PLATE I

PREFACE

The portion of Mercer County covered by this report is subject to flooding by Shabakunk Creek, West Branch Shabakunk Creek, and Little Shabakunk Creek, all of which are tributaries to the Assunpink Creek. Commercial and residential properties along these streams have been severely damaged by floods in 1938, 1955, 1967, and 1971. The flood plain is extensively developed and may come under more pressure for development in the future. Although large floods have occurred in the past, studies indicate that even larger floods are possible.

This report presents flood hazard information which is important in land use planning and for management decisions concerning flood plain utilization. It includes a history of flooding along Assunpink Creek and its tributaries and identifies those areas that are subject to possible future floods. Special emphasis is given to these possible future floods through maps, photographs, profiles, and cross sections. The report does not provide solutions to flood problems; however, it does furnish a suitable basis for the adoption of land use controls to guide flood plain development and thereby prevent intensification of the loss problems. It will also aid in the identification of areas where other flood damage reduction techniques such as works to modify flooding and adjustments including flood proofing might be embodied in an overall flood plain management (FPM) program. Other FPM program studies --those of environmental attributes and the current and future land use role of the flood plain as part of its surroundings -- would also profit from this information.

At the request of the Mercer County Planning Board and the New Jersey Department of Environmental Protection, this report was prepared by the Philadelphia District Office of the U.S. Army Corps of Engineers under the continuing authority provided in Section 206 of the 1960 Flood Control Act, as amended.

Assistance and cooperation of the Mercer County Planning Board, Free Public Library of Trenton, United States Geological Survey (U.S.G.S.), "Trenton Evening Times", and private citizens in supplying useful data and photographs for the preparation of this report is appreciated.

Additional copies of this report can be obtained from the Mercer County Planning Board. The Philadelphia District Office, upon request, will provide technical assistance to planning agencies in the interpretation and use of the data presented as well as planning guidance and further assistance, including the development of additional technical information.

BACKGROUND INFORMATION

Settlement

In the early years of the seventeenth century, the land which is now Mercer County was dominated by the Indians of the Lenni-Lenape Tribe. Settlers from New York ventured down over Indian trails which converged at the head of the tidewater at "Ye Falls of Ye De La Warre" and began trading with the Indians. The first settlement--now Trenton--was established at this site in 1676. Trenton, named for Judge William Trent of Philadelphia, had a most advantageous location along the Delaware River. Navigation on the river was limited by the falls and many cargoes had to pass through Trenton. From the time of its first settlement, Trenton was a major port on the Delaware River.

As Trenton developed and prospered, new communities formed rapidly in the surrounding areas. People settled along the numerous streams in Mercer County and, in particular, along the Assunpink, Shabakunk, West Branch Shabakunk, and Little Shabakunk Creeks. The fertile soil produced many agricultural products for shipment and use as raw materials in the early industries. Economically and militarily, the Trenton area played an important role in the Revolutionary War. After the war, as efforts were concentrated on industrial growth, many types of mills and industries were constructed along the waterways as the people took advantage of the ample supply of good quality water.

With the construction of the railroads and the Delaware Raritan Canal in the 1830's, even more raw materials were shipped to the Trenton area and it became one of the leading manufacturing cities of the nation. Much development occurred on the flood plains of Assunpink, Shabakunk, West Branch Shabakunk, and Little Shabakunk Creek as growth and subsequent expansion took place. At the present time, the flood plains of these creeks are highly developed in the Trenton area. Development of flood plain areas will continue at a rapid pace as the growth and expansion reduces the amount of other land available for building sites.

The Stream and Its Valley

Shabakunk Creek, West Branch Shabakunk Creek and Little Shabakunk Creek are tributaries to the Assunpink Creek, a major stream of the Delaware River Basin. The Assunpink Creek, with a drainage area of 89.4 square miles, originates in Monmouth County, New Jersey, but the largest portion of the watershed lies in Mercer County. The Assunpink Creek watershed is one of the ground water recharge areas for the large water-bearing formation underlying southern New Jersey.

All of the streams covered in this report lie within Mercer County and flow through low hills with the ground surface undulating slightly. The soil of the three watersheds is a light, loamy, alluvial type.

Shabakunk Creek, with a drainage area of 12.3 square miles, originates in Hopewell Township and flows southerly and then easterly to its confluence with the Assunpink Creek in Lawrence Township. Most of its watershed has been residentially developed and additional development of individual home sites and subdivisions is reducing the perviousness of the area. Overbank areas adjacent to the stream have heavy trees and brush with some short grass present. The stream has low banks with little vegetation or rock in the channel. The 6.2 mile study reach has a fairly uniform slope averaging 10 feet per mile.

West Branch Shabakunk Creek, with a drainage area of 4.9 square miles, originates in Ewing Township and flows southeasterly and then easterly to its confluence with Shabakunk Creek in Lawrence Township. The watershed has been highly developed and much of the area is impervious to rainfall. New commercial development is creating additional impervious areas. In general, the stream has high banks with little evidence of vegetation or rocks in the channel. Along several portions of the stream, a rectangular channel has been formed by retaining walls and buildings. The overbank area has scattered trees and brush with some grassy lawns. The 5.2 mile study reach, which has a steeper slope on the upper portion than on the lower portion, slopes an average of 20 feet per mile.

Little Shabakunk Creek, with a drainage area of 4.1 square miles, originates in Lawrence Township and flows southeasterly to its confluence with the Assunpink Creek. The watershed has been residentially developed and the amount of pervious area will decrease as new development occurs. The 3.4 mile study reach of Little Shabakunk Creek also has a fairly uniform slope averaging 15 feet per mile. Drainage areas of Shabakunk Creek, West Branch Shabakunk Creek and Little Shabakunk Creek are noted in Table 1 and shown on the General Map, Plate 1.

Typical of the temperate zones, the climate of Mercer County is moderate with temperatures that may drop below 20 degrees in the winter or rise above 85 degrees in the summer, January being the coldest month and July the warmest. The annual rainfall of 40 to 45 inches is rather evenly distributed over all the months. The prevailing winds are westerly and southwesterly during most of the year.

TABLE 1
DRAINAGE AREAS

Shabakunk, West Branch Shabakunk and Little Shabakunk Creeks

Location	Mileage Above Mouth	Drainage Area	
		Tributary sq. mi.	Total sq. mi.
Shabakunk Creek			
Confluence with Assunpink Creek	0	---	12.3
Downstream of Confluence with West Branch Shabakunk Creek	2.19	4.9	10.8
Upstream of Confluence with West Branch Shabakunk Creek	2.19	---	5.9
Bull Run Rd.	6.14	---	2.8
West Branch Shabakunk Creek			
Confluence with Shabakunk Creek	0	---	4.9
Little Shabakunk Creek			
Confluence with Assunpink Creek	0	---	4.1

Developments in the Flood Plain

Shabakunk Creek has commercial development on the flood plain in the vicinity of Brunswick Pike (U.S. Rte 1). A large shopping center at this location was inundated by the flood of August 1971. From this point upstream to its headwaters, most of the flood plain development has been residential subdivisions, with the individual lots adjoining the stream.

West Branch Shabakunk Creek has the most concentrated development of the three streams in this study. Near Olden Avenue, a furniture store and restaurant abut the channel. Between Spruce Street and Olden Avenue, numerous commercial buildings have been constructed on the flood plain. At Parkside Avenue, commercial buildings are also constructed on the flood plain and the stream passes beneath a new row of stores. From the second crossing of Olden Avenue upstream to Carlton Avenue, the flood plain has highly concentrated residential development. Many of these properties have been damaged by floods in the past. The upper portion of the West Branch Shabakunk Creek watershed is presently undergoing residential development.

Little Shabakunk Creek also has commercial development near Brunswick Pike (U.S. Rte. 1). Upstream of this point most of the flood plain development has been residential. The upper portion of Little Shabakunk Creek flows through the campus of Rider College and several buildings are located on the flood plain in this area.

Table 2 entitled "Population Trends and Projections of Mercer County by Municipalities" shows a slight decrease in the urban population of Trenton, but an overall population increase in Mercer County. As the population increases and shifts outward from urban areas, flood plain land in suburban and rural areas will come under increasing pressure for development.

TABLE 2
POPULATION TRENDS AND PROJECTIONS OF MERCER COUNTY BY MUNICIPALITIES

Area	Population Trends				Population Projections			
	1960[a]		1970[a]		1980		1990	
	Number	Percent Change 1950/1960	Number	Percent Change 1960/1970	Number	Percent Change 1970/1980	Number	Percent Change 1980/1990
East Windsor Township	2,298	79.0	11,736	410.7	36,000	206.7	59,330	64.8
Ewing Township	26,628	58.1	32,831	23.3	36,700	11.8	39,000	6.3
Hamilton Township	65,035	58.0	79,609	22.4	100,000	25.6	140,000	40.0
Hightstown Borough	4,317	16.3	5,431	25.8	5,800	6.8	6,330	9.1
Hopewell Borough	1,928	3.2	2,271	17.8	2,600	14.5	2,670	2.7
Hopewell Township	7,818	65.3	10,030	28.3	13,200	31.6	22,670	71.7
Lawrence Township	13,665	60.8	19,567	43.2	27,600	41.1	40,000	44.9
Pennington Borough	2,063	22.7	2,151	4.3	2,500	26.0	2,670	6.8
Princeton Borough	11,890	–2.8	12,311	3.5	12,800	3.9	13,300	11.7
Princeton Township	10,411	92.5	13,651	31.1	17,850	30.8	23,000	28.9
Trenton	114,167	–10.8	104,638	–8.3	94,800	–9.4	91,330	–3.7
Washington Township	2,156	17.0	3,311	53.6	6,600	99.4	13,470	104.1
West Windsor Township	4,016	59.4	6,431	60.1	13,300	107.0	28,670	115.6
Mercer County	266,392	15.9	303,968	14.1	369,750	21.6	482,440	30.5

[a]Figures taken from U.S. Bureau of Census

FLOOD SITUATION

Sources of Data and Records

There are no stream gaging stations on Shabakunk Creek, West Branch Shabakunk Creek, and Little Shabakunk Creek. However, the United States Geological Survey maintains a gaging station on the Assunpink Creek in the City of Trenton. The location of the gaging station is shown on the General Map. Records from this gage were used in the hydrologic computations for each of the three streams in this study.

High water elevations from Hurricane Doria (August 27-28, 1971) on the Shabakunk Creek and West Branch Shabakunk Creek were obtained from Special Report 37 entitled "Floods of August and September 1971 in New Jersey" as prepared by the United States Department of the Interior, Geological Survey, 1972. Geological data used in the preparation of this study was obtained from Special Report 19 entitled "Ground Water Resources of Mercer County, New Jersey" as prepared by the United States Department of the Interior, Geological Survey, 1962. To supplement the records at the gage and the other available data, newspaper files, historical documents, and records were searched for information concerning past flooding. From these records, a knowledge of flooding on Shabakunk Creek, West Branch Shabakunk Creek, and Little Shabakunk Creek has been developed.

Maps prepared for this report were based on photogrammetric mapping supplied by the Mercer County Planning Bcard. Structural dimensions of bridges and culverts were obtained from field surveys by personnel from the Philadelphia District, Corps of Engineers.

Flood Season and Flood Characteristics

Three of the four highest floods on Shabakunk Creek, West Branch Shabakunk Creek, and Little Shabakunk Creek were the result of heavy rainfall associated with hurricanes. These floods occurred in September 1938, August 1955 (Hurricane Diane), and in August 1971 (Hurricane Doria). However, heavy rainfall on the basin can cause major floods during all seasons of the year. During floods, flows can increase from normal to peak quantities in a relatively short period of time with high velocities in the main channel.

Flood stages on the Assunpink Creek produce a backwater effect that increases flood heights at the mouth of Shabakunk Creek and Little Shabakunk Creek. In addition to greater depths of floodwaters, larger areas of the flood plain are inundated resulting in increased damage to surrounding development.

Factors Affecting Flooding and Its Impact

Obstructions to floodflows - Natural obstructions to floodflows include trees, brush and other vegetation growing along the stream banks in floodway areas. Man-made encroachments on or over the streams such as dams, bridges, and culverts can also create more extensive flooding than would otherwise occur. Figure 1 shows a possible obstruction to floodflow.

During floods, trees, brush and other vegetation growing in floodways impede floodflows, thus creating backwater and increased flood heights. Trees and other debris may be washed away and carried downstream to collect on bridges and other obstructions to flow. As floodflows increase, masses of debris break loose and a wall of water and debris surges downstream until another obstruction is encountered. Debris may collect against a bridge until the hydraulic load exceeds its structural capacity and the bridge is destroyed. The limited capacity of obstructive bridges or culverts, debris plugs at the culvert mouth or a combination of these factors retard floodflows and result in flooding upstream, erosion around the culvert entrance and bridge approach embankments and possible damage to the overlying roadbed.

In general, obstructions restrict floodflows and result in overbank flows and unpredictable areas of flooding, destruction of or damage to bridges and culverts, and, an increased velocity of flow immediately downstream. It is impossible to predict the degree or location of the accumulation of debris; therefore, for the purposes of this report, it was necessary to assume that there would be no accumulation of debris to clog any of the bridge or culvert openings in the development of flood profiles.

The 5 small dams located on Shabakunk Creek and Little Shabakunk Creek have no flood control capacities nor do they seriously alter flow characteristics of floodwaters.

Shabakunk Creek, West Branch Shabakunk Creek, and Little Shabakunk Creek are spanned by 51 bridges. Pertinent information on all bridges can be found in Table 6 on Page 23. Many of these bridges are obstructive to floodflows.

Flood damage reduction measures - There are no existing, proposed, or authorized flood control or related measures in the study area or upstream in the watershed. However, the State of New Jersey enacted an encroachment law in 1929 which is essentially a preventive flood loss measure. The law is known as the "1929 Encroachment Law (RS 58:1-26)" and is administered by the Division of Water Resources of the Department of Environmental Protection. The law reads in part as follows:

> "No structure within the natural and ordinary high water mark of any stream shall be made by any public authority or private person or corporation without notice to the (Division) and in no case without complying with such conditions as the (Division) may prescribe for preserving the channel and providing for the flow of water therein to safeguard the public against danger from the waters impounded or affected by such a structure and this prohibition shall apply to any renewal of existing structures."

Under the provision of this law, the Division issues permits for the construction of bridges, culverts, fills, walls, channel improvements, pipe crossings and other encroachments located within the natural and ordinary high water mark of the stream. Another New Jersey encroachment law (Chapter 229, Laws of 1938, amending a previous law known as RS 40:56-1), permits municipalities of the State to construct improvements, remove obstructions, define the location, establish widths, grades, and elevations of any stream and to prevent encroachments thereon--subject to approval by the State of the flood carrying capacity to be provided. Under this law, counties in New Jersey are permitted to assist municipalities in local flood damage alleviation programs.

The New Jersey Flood Plain Designation and Marking Law, enacted in 1962 [NJSA 58:16A(50 et. seq.)] *and as amended December 14, 1972,* empowers the Division of Water Resources to delineate and mark flood hazard areas, to authorize the Department of Environmental Protection to adopt land use regulations, and to coordinate effectively the development, dissemination and use of information on floods and flood damage that may be available. The development of adequate flood plain information, as furnished in this report, will enable state and local authorities to further implement existing statutes and regulations.

Other factors and their impacts - The impact of flooding along Shabakunk Creek, West Branch Shabakunk Creek, and Little Shabakunk Creek can be affected by the ability of local residents to anticipate and effectively react to a flood emergency. Efficient flood warning and forecasting systems can give homeowners, business, and industry valuable time to remove damageable materials from low-lying areas. Increased damages to downstream areas can also be reduced if floatable materials stored on the flood plain can be removed before being carried downstream to block bridge and culvert openings. Implementation of effective flood fighting and emergency evacuation plans can further reduce flood damages and the incidence of personal injury and death once the creek has reached flood stage.

Flood warning and forecasting - Inhabitants of the area depend entirely on the usual warnings issued through radio, television, and the local press media. The National Oceanic and Atmospheric Administration (NOAA) maintains year-round surveillance of weather conditions at Trenton, New Jersey. Commercial radio stations receive information on hurricanes, tornadoes, and flash flood warnings and broadcast to the public through the

Emergency Weather Network in cooperation with the New Jersey Civil Defense Disaster Control (CD-DC). The State CD-DC also receives the information directly from Trenton and disseminates the forecasts through its own communications system to area, county and local Civil Defense Offices.

Flood fighting and emergency evacuation plans - Although there are no formal flood fighting or emergency evacuation plans for Shabakunk Creek, West Branch Shabakunk Creek and Little Shabakunk Creek during a flood emergency, area residents are alerted through local communications media by the Mercer County Civil Defense Office. The office maintains communications with the State Civil Defense Headquarters and coordinates flood fighting evacuation and rescue activities on a county-wide basis with local agencies.

Material storage on the flood plain - The flood plain of Shabakunk Creek, West Branch Shabakunk Creek, and Little Shabakunk Creek is occupied mainly by residential structures and commercial establishments. Very little buoyant material is stored on the flood plain, but waste containers, small sheds, and wooden foot bridges that are unrestrained may be carried away by floodflows. Also, vehicles parked at shopping centers may be inundated by rapidly rising floodwaters and carried downstream with other debris. During floods, all types of buoyant material and objects can clog downstream bridge openings and create more hazardous flooding problems and serious damage to structures.

Figure 1 - Fence across Little Shabakunk Creek could be obstructive during times of floodflow.

PAST FLOODS

Summary of Historical Floods

Floods causing significant damage to the area occurred in September 1938, August 1955, March 1967, and August 1971. High water marks recorded during the flood of August 1971 indicate this flood to be the flood of record for Shabakunk Creek and West Branch Shabakunk Creek.

Flood Records

Gage records are not available for Shabakunk Creek, West Branch Shabakunk Creek and Little Shabakunk Creek. However, floodflows recorded on the Assunpink Creek at Trenton, New Jersey, reflect floods that occurred at the same time on these three streams.

Flood data on the Assunpink Creek was obtained by the United States Geological Survey at Trenton, New Jersey. The Gage (No. 4640) has been in operation from January 1924 to the present. Flood crest elevations and discharges for known floods at this gaging station are shown in Table 3. High water elevations on Shabakunk Creek and West Branch Shabakunk Creek, as taken from Special Report 37, are shown in Table 5 on page 20.

TABLE 3
FLOOD CREST ELEVATIONS

Assunpink Creek at Trenton, New Jersey, U.S. Geological Survey
Gage No. 4640

Date of Crest	Estimated Peak Discharge cfs	Stage[a] Feet	Elevation[b] Feet-m.s.l.d.
August 28, 1971	3,920	13.46	38.22
September 22, 1938	3,320	10.74	35.50
March 7, 1967	2,660	9.91	34.67
August 13, 1955	2,400	9.29	34.05
July 23, 1938	2,370	8.90	33.66
February 28, 1958	2,300	9.16	33.92

[a] Bankfull stage is 8 feet.

[b] Datum of Gage is 24.76 feet above mean sea level datum (New Jersey Geological Survey bench mark).

Flood Descriptions

The following descriptions provide graphic accounts of the large floods that occurred on Shabakunk Creek, West Branch Shabakunk Creek, and Little Shabakunk Creek in the vicinity of Trenton, New Jersey, and neighboring communities.

September 22, 1938 - A violent fall hurricane with heavy rain and wind struck New Jersey as well as the other North Atlantic States and Canada.

EXCERPTS FROM THE TRENTON EVENING TIMES,[a]
SEPTEMBER 22, 1938

Thousands Left Homeless; Gigantic Rescue Job Starts; River Stirs Fears of Flood

The ever-lengthening roster of the dead from an equinoctial hurricane which struck the North Atlantic States with a savageness unequalled in a hundred years neared the 250 mark today--and still the tragic figures mounted.

The damage to property--to hundreds of smashed boats, to growing or maturing crops, to homes, utilities, public buildings, transportation and communications--was beyond calculation, rising to uncounted millions of dollars. How many thousands were homeless could not even be guessed.

Delaware at Trenton Is Rising at Alarming Pace

Danger of flood faced Trenton today as the Delaware River, swollen by excessive rainfall, raged along at a level that hourly looked more menacing.

The swollen subsidiaries of the river gave further concern to harrassed residents. In one section of Hamilton Township, a number of persons were marooned and were rescued by police in boats.

The Assunpink Creek, swollen beyond capacity, rose over its banks and flooded cellars of property nearby. Outlying districts of Trenton were particularly hard hit by the storm and its ensuing flood, especially in Hamilton Township where roads were blocked and trees blown down. In Ewing Township nearly two feet of water covered the Shabakunk and Upper Ferry Roads, stalling cars and creating a traffic hazard.

August 13 - 18, 1955 - On August 13, 1955, heavy rainfall accompanying Hurricane Connie caused flooding and damage on the Assunpink Creek and its tributaries, Shabakunk Creek, West Branch Shabakunk Creek, and Little Shabakunk Creek. Backwater from the Assunpink Creek caused additional flooding at its confluence with Shabakunk Creek and Little Shabakunk Creek. On August 18, 1955, Hurricane Diane followed Hurricane Connie and caused the great disaster on the Delaware River. Backwater from the river caused severe damage along the Assunpink Creek in the City of Trenton. Due to the magnitude of this flood on the Delaware River, flooding on the Shabakunk Creek and Little Shabakunk Creek received only minor attention in reportings by local news media.

[a]Simulated from newspaper clippings.

March 7, 1967 - A gale-powered northeaster dumped heavy snows over a large portion of the United States and over 3 inches of rain on the Trenton area.

EXCERPTS FROM THE TRENTON TIMES,[a] MARCH 7, 1967

Deluge Perils Entire State

The Delaware Valley was hit today with the worst flood in 10 years and plants and homes were affected by the high water. The total rainfall in the storm that began Saturday measured 3.32 inches by 11:30 a.m. today. In the past 24 hours there was 2.46 inches of rain...Thomas Sweeney, planning manager of the Goodall Rubber Company, said the plant was forced to shut down its boilers about 9:30 a.m. because the boiler room was flooding...There are 30 bridges in Mercer County crossing the Assunpink and the creek was expected to overflow all of them.

Following are newspaper excerpts giving light to the history of flooding in the Trenton, New Jersey, area since 1692:

EXCERPTS FROM THE SUNDAY TIMES ADVERTISER, TRENTON, NEW JERSEY,[a] AUGUST 29, 1971

Floods, An Old 1692-1903 Story for Delaware Valley

It started raining here early in the afternoon of October 8, 1903, and continued for about nine hours. The next day the skies really opened up, dumping 5-1/2 inches on the area. One day later the Delaware River and surrounding streams went on a rampage. Another flood occurred five months later. This time it was the breakup of ice jams rather than heavy rain that caused the flooding.

The most destructive flood ever to swamp the Delaware Valley was the drought and rain-induced tragedy of August 1955. Early that summer there wasn't a drop of rain for weeks. Then, on August 7, came the rain--2.9 inches of it in about an hour.

Five days later, with the ground still soaked, Hurricane Connie came roaring up the Atlantic Coast. It dropped more than five inches of rain on this area in what seemed a never-ending 32 hours.

Six days later on August 18, Hurricane Diane came along with five more inches of rain. The three days of flooding that ensued will be remembered even by today's 18-year olds.

The earliest flood recorded here was that of 1687. It was reported as "the great flood and rupture" at the falls of the Delaware and it was "followed by great sickness".

1692 - This one, "the first great flood" here was attributed to the melting snow at near end of winter.

1731 - This one happened late in February and was referred to as "the greatest freshet in the Delaware since 1692".

1733 - Of this one the "New England Weekly Journal" reported: "The freshets have done much damage at Trenton and carried away the dam of the iron works and the dam of the grist mill".

1822 - The Warren Street bridge was swept away in this freshet on February 21. A day later, the Greene (now Broad) Street bridge gave away.

(Between 1692 and 1903 there were 43 freshets in the Delaware, the two worst occurring in 1841 and 1862).

1936 - March 19, 1936. Yardley and Morrisville were hit hard by this one and so was the "Island" section of Trenton where some 200 families were marooned.

Among the flood episodes to follow were those of 1950, 1951, 1967, and 1968.

Let us hope that the late summer of 1971 does not become part of a tragic record that started in 1687.

[a]Simulated from newspaper clippings.

August 28, 1971 - Hurricane Doria caused the severest flooding in the history of New Jersey, with loss of life and untold damage and destruction throughout the state. The following excerpts from various newspapers appeared during a three-day period:

EXCERPTS FROM THE SUNDAY TIMES ADVERTISER, TRENTON, NEW JERSEY,[a] AUGUST 29, 1971

Record Rain, Floods Rout Thousands; Cahill Weighs A State of Emergency

Record flooding of rivers and streams following the most intense rainfall in New Jersey history drove thousands of families from their homes and almost paralyzed many sections of the state yesterday.

Governor William T. Cahill's office said the Governor probably will declare a state of emergency... About one-fourth of Hamilton Township was declared to be in a state of emergency by Mayor Raymond I. Dwier. The most serious damage in Mercer County was caused by the Assunpink Creek, which crested at 13.45 feet, almost seven feet above flood stage. The main line of the Penn Central was shut down when about three feet of water from clogged Assunpink flowed across the tracks at the Clinton Street Station.

EXCERPTS FROM THE TRENTONIAN, TRENTON, NEW JERSEY,[a] AUGUST 30, 1971

Doria Leaves 3 Dead, $15 Million Ruin Here U.S. Aid Sought by City, Hamilton

Hamilton Township and Trenton mounted massive rescue operations this weekend, in the wake of Hurricane-fed floods that caused up to three deaths, drove hundreds of families from their homes and ruined an estimated $15 million worth of property... Three hundred persons were evacuated from homes in Hamilton, and another three hundred in Trenton... It was the Assunpink Creek running through West Hamilton and North and South Trenton that caused major damage, rising to nearly 14 feet... The flooding halted all Penn Central rail traffic through Trenton for 28 hours, leaving the tracks 40 inches under water in places... In Ewing Township Police Capt. Robert Plaag said the storm and floods probably cost around $450,000, including the physical damages and costs of emergency operations.

[a]Simulated from newspaper clippings.

EXCERPTS FROM THE EVENING TIMES, TRENTON, NEW JERSEY[a]
AUGUST 31, 1971

Industry Hard Hit by Flood

The Ewing-Lawrence Sewer Authority (ELSA) treatment plant is operating at three quarters capacity today in the wake of flooding which caused more than $225,000 damage to the sewer system.

William Higgins, director of the authority, reported that flood-waters which swamped the headquarters on Whitehead Road, Lawrence Township, caused some $75,000 damage to the treatment plant. Also, an estimated $150,000 will be needed to remove silt from collector lines.

Industrial plants along the Assunpink continued their mop-up operations today. James Floyd of Stokes Molded Products said today that damage totaled $1 million, and added he has no idea when the plant can begin operations again.

At the nearby Crescent Wire plant damage was estimated at $50,000. The plant probably will be closed for two weeks, putting some 300 people out of work.

EXCERPTS FROM THE TRENTONIAN, TRENTON, NEW JERSEY [a]
AUGUST 31, 1971

Doria Damage Set at $25 Million

The Doria floods caused an estimated $25 million in property damages, according to the "flash" report given Gov. William T. Cahill by William Falcey, Mercer County civil defense coordinator.

The civil defense chief said preliminary reports indicated $9 million damages in Hamilton Township and $4.5 million damages in Trenton with the balance in the suburbs.

The worst day for Public Service [meaning electric and gas], according to the spokesman, was Saturday, when more than 15,000 area residents were without electricity. Hardest hit was Ewing Township, where the rampaging waters of the Shabakunk Creek overran a substation and knocked out power for 6,000 customers.

The following aerial photographs, Figures 2 through 5, show the vast area that was flooded during Hurricane Doria, August 28, 1971.

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[a]Simulated from newspaper clippings.

Figure 2 - Shabakunk Creek between Brunswick Pike (U.S. Rte. 1) and Princeton Pike N.J. Rte. 583 overflows into the Lawrence Shopping Center.

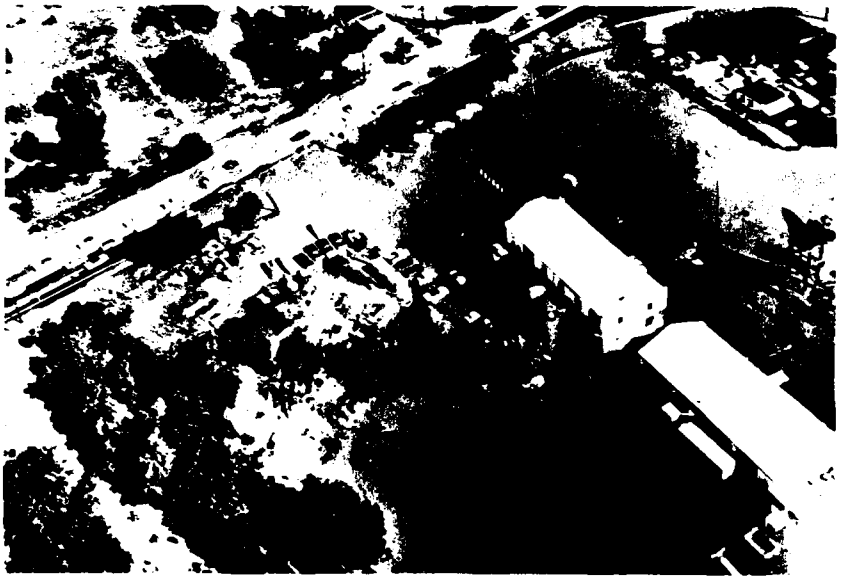


Figure 3 - Little Shabakunk Creek flows under Brunswick Pike (U.S. Rte. 1) on the left side of the photograph, but inundates a large portion of roadway and the adjacent area.

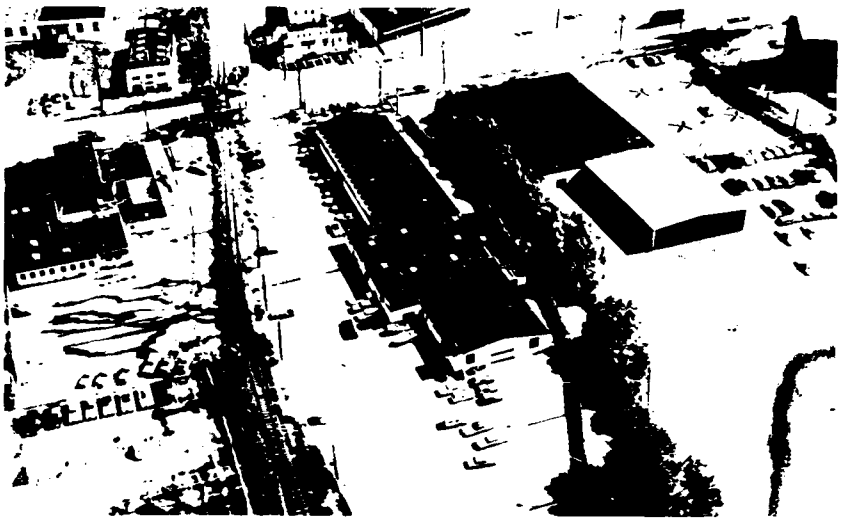


Figure 4 - West Branch Shabakunk Creek flows under Olden Avenue between the Reading R.R. on the left side and Arctic Parkway on the upper right side. Commercial establishments on both sides of the stream suffered heavy damages.

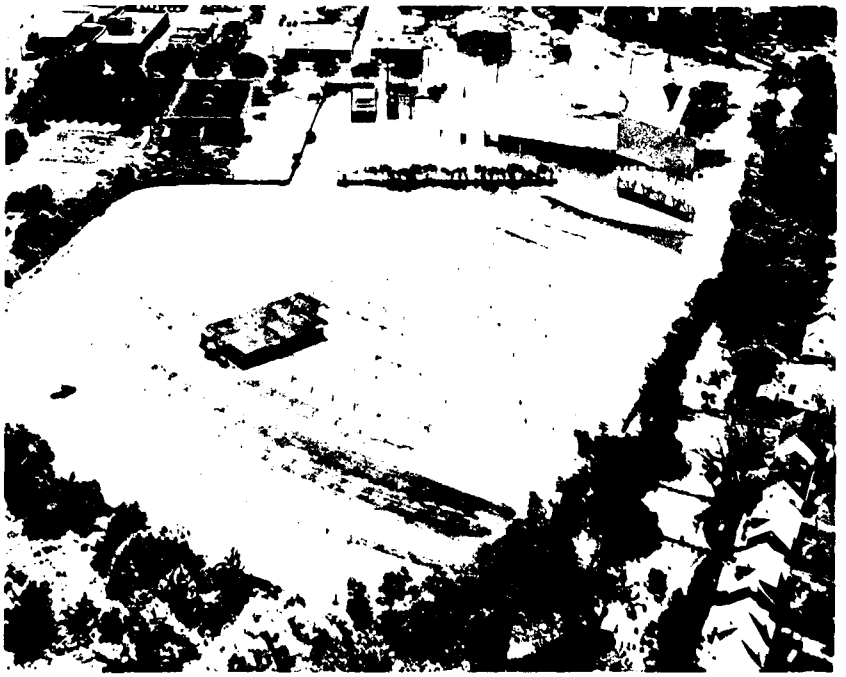


Figure 5 - West Branch Shabakunk Creek flows under Prospect Street in the upper right-hand side of the photograph, but inundates the Ewing Drive Theatre and numerous commercial buildings. Inundation of the electrical substation in the center of the photograph caused a power failure that affected thousands of residents.

FUTURE FLOODS

Floods of the same or larger magnitude as those that have occurred in the past could occur in the future. Large floods have been experienced in the past on streams with similar geographical and physiographical characteristics as those found in the study area. Similar combinations of rainfall and runoff which caused the floods could occur in the study area. Therefore, to determine the flood potential of the study area, it was necessary to consider storms and floods that have occurred in regions of like topography, watershed cover, and physical characteristics. Discussion of the future floods in this report has been limited to those that have been designated as the Floodway Design Flood (FDF), the Flood Hazard Area Design Flood (FHADF), and the Standard Project Flood (SPF). In the hydrologic region that includes the Shabakunk Creek Watershed, the Floodway Design Flood is equivalent to a flood having an average recurrence interval of once in 100 years. The 100-year event is designated the Intermediate Regional Flood (IRF) by the Corps of Engineers. A reasonable upper limit of expected flooding in the area is represented by the Standard Project Flood. The Floodway Design Flood and the Flood Hazard Area Design Flood may reasonably be expected to occur more frequently although they will not be as severe as the infrequent Standard Project Flood.

Floodway Design and Flood Hazard Area Design Floods

The State of New Jersey defines "Floodway" as the channel and portion of the adjacent flood plain necessary to preserve the natural regimen of a stream for the reasonable passage of the Floodway Design Flood. The "Flood Hazard Area" includes the floodway and any additional portions of the flood plain inundated by the Flood Hazard Area Design Flood.

Both the Floodway Design Flood and the Flood Hazard Area Design Flood are used extensively by the State of New Jersey for flood plain management programs. Methods for the determination of these design floods are contained in "New Jersey Flood Hazard Report No. 1, Delineation of Flood Hazard Areas". The method applied "multiples" to the mean annual flood as determined by regional analysis prescribed in New Jersey Water Resources Circular No. 13, "Floods in New Jersey: Magnitude and Frequency". This circular was prepared in 1964 by the U.S. Geological Survey in cooperation with the State of New Jersey. Peak flows for both the Floodway Design Flood and the Flood Hazard Area Design Flood at selected locations are given in Table 4. The relative water surface elevations for the Floodway Design Flood and the Flood Hazard Area Design Flood are shown on Plates 28 through 30.

Standard Project Flood

The Standard Project Flood is defined as a major flood that can be expected to occur from a severe combination of meteorological and hydrological conditions that are considered reasonably characteristic of the geographical area in which the study is located, excluding extremely rare combinations. The Corps of Engineers, in cooperation with NOAA, has made comprehensive studies and investigations based on the past records of experienced storms and floods and has developed generalized procedures for estimating the flood potential of streams. Peak discharges for the Standard Project Flood at selected locations in the study area are given in Table 4. Discharge hydrographs for the Standard Project Flood at selected locations are shown on Plate 34. Relative water surface elevations for the Standard Project Flood are shown on Plates 28 through 30.

Table 5 gives flood elevations for the Standard Project Flood, Flood Hazard Area Design Flood, Floodway Design Flood, and the flood of August 28, 1971, Hurricane Doria.

TABLE 4

PEAK FLOWS FOR FLOODWAY DESIGN, FLOOD HAZARD AREA DESIGN, AND STANDARD PROJECT FLOODS

Location	River Mile	Drainage Area Sq. Mi.	Floodway Design Flood Discharge cfs	Flood Hazard Area Design Flood Discharge cfs	Standard Project Flood Discharge cfs
Shabakunk Creek					
Confluence with Assunpink Creek	0.0	12.3	2,500	3,150	6,300
Downstream of confluence with West Branch Shabakunk Creek	2.19	10.8	2,250	2,800	5,500
Upstream of confluence with West Branch Shabakunk Creek	2.19	5.9	1,400	1,800	3,300
Bull Run Rd. (Study Limit)	6.14	2.8	750	950	1,800
West Branch Shabakunk Creek					
Confluence with Shabakunk Creek	0.0	4.9	1,200	1,500	2,400
Little Shabakunk Creek					
Confluence with Assunpink Creek	0.0	4.1	1,100	1,400	2,050

TABLE 5
FLOOD ELEVATIONS

Stream and Location	Mileage Above Mouth	Elevation[a] Standard Project Flood (SPF)	Flood Hazard Area Design Flood (FHADF)	Floodway Design Flood (FDF)	Aug. 28, 1971 (Hurricane Doria)
Shabakunk Creek					
Lawrence Twp., N.J., 40 ft. downstream from mouth of West Branch Shabakunk Creek, left bank	2.18	65.4	62.7	62.2	63.7
Braeburn Heights, N.J., 1 mile northeast, near end of Whitehead Rd. extension	2.76	67.6	65.5	64.8	66.2
Braeburn Heights, N.J., just upstream from Ewingville Rd. (Parkside Ave.), right bank	3.57	78.0	76.4	75.7	76.4
Braeburn Heights, N.J., near Hollow Brook Rd. and Claflin Ave. dumping area, left bank	4.17	80.9	79.9	79.4	80.6
Ewingville, N.J., 50 ft. upstream from Green Lane bridge, right bank	4.48	86.0	84.0	83.4	84.1
Ewingville, N.J., upstream from Sylvia Lake Dam, right bank	4.90	95.4	94.0	93.5	94.2
Ewingville, N.J., near Ewingville and Federal City Roads, right bank	5.27	97.7	95.0	94.2	97.3
Ewingville, N.J., near end of Lopatcong Drive, right bank	5.92	112.1	109.9	109.2	110.2
West Branch Shabakunk Creek					
Trenton, N.J., on Fourth Street, 80 ft. upstream of Spruce Street, left bank	0.42	66.6	64.8	64.3	67.9
Trenton, N.J., 100 ft. upstream from Olden Avenue bridge, left bank	0.81	72.9	71.4	69.6	71.6
Trenton, N.J., 80 ft. upstream from Reading R.R. bridge, left bank	0.95	73.7	72.4	71.6	72.6
Trenton, N.J., 80 ft. upstream from Prospect Street bridge, left bank	1.19	76.4	74.5	73.9	75.4

[a]Feet, mean sea level datum.

Frequency

Regionalized frequency curves of peak flows were developed at selected stations along Shabakunk Creek, West Branch Shabakunk Creek, and Little Shabakunk Creek by methods prescribed in New Jersey Water Resources Circular No. 13, "Floods in New Jersey: Magnitude and Frequency".

The curves represent the frequency of floodflows up to a magnitude of once in 100 years (Floodway Design Flood). The curves, which are available upon request, reflect the judgment of engineers who have studied the area and are familiar with the region; however, it must be regarded as approximate and should be used with caution in connection with any planning of flood plain use.

The Standard Project Flood is considered the reasonable upper limit of expected flooding, but floods of even greater magnitude have a probability of occurring in the study area. Frequencies of floods equivalent to the Standard Project Flood or larger can be obtained through extrapolation of the curve, but it is not practical to assign a frequency to such large flows as their occurrence is so extremely rare.

Hazards of Large Floods

The extent of damage caused by any flood depends on the topography of the area flooded, depth and duration of flooding, velocity of flow, rate of rise, and developments in the flood plain. A Floodway Design Flood, Flood Hazard Area Design Flood, or Standard Project Flood on Shabakunk Creek, West Branch Shabakunk Creek, and Little Shabakunk Creek would result in the inundation of residential and commercial properties in the study area. Deep floodwater flowing at high velocity and carrying floating debris would create conditions hazardous to persons and vehicles attempting to cross flooded areas. In general, floodwater three or more feet deep and flowing at a velocity of three or more feet per second could easily sweep an adult person off his feet, thus creating definite danger of injury or drowning. Rapidly rising and swiftly flowing floodwater may trap persons in homes that are ultimately destroyed, or in vehicles that are ultimately submerged or floated. Waterlines can be ruptured by deposits of debris and the force of floodwaters, thus creating the possibility of contaminated domestic water supplies. Damaged sanitary sewer lines and sewage treatment plants could result in the pollution of floodwaters creating health hazards. Isolation of areas by floodwater could increase dangers during medical, fire, or law enforcement emergencies.

Flooded areas and flood damages - The areas along Shabakunk Creek, West Branch Shabakunk Creek, and Little Shabakunk Creek that would be flooded by the Standard Project Flood are shown on Plate 2 which is also an index map to Plates 3 through 27. Areas that would be flooded by the Floodway Design Flood, Flood Hazard Area Design Flood, and the Standard Project Flood are shown in detail on Plates 3 through 27. The actual limits of overflow may vary slightly from those shown on the maps because of the accuracy limitation of the aerial mapping.

On Shabakunk Creek, floodwaters may inundate a large portion of the Lawrenceville Shopping Center on Brunswick Pike (U.S. Route 1). Numerous bridges, roads, and tracks of the Reading Railroad are also subject to flooding. Residential areas along Little Shabakunk Creek and stores in the vicinity of Brunswick Pike (U.S. Route 1) may be flooded. On West Branch Shabakunk Creek, commercial buildings near Olden and Prospect Avenues are subject to flooding, and an electric substation may be flooded and put out of service as it was during Hurricane Doria in August 1971. In addition to residential and commercial structures, utilities and sanitary sewer lines may be damaged or destroyed by floodwaters.

Considerable damages to the facilities would occur during the Floodway Design and the Flood Hazard Area Design Floods. However, due to the wider extent, greater depths of flooding, higher velocity of flow and longer duration of flooding during a Standard Project Flood, damage would be more severe than during the Floodway Design and the Flood Hazard Area Design Floods. Plates 28 through 30 show water surface profiles for all three design floods. Depth of flow in the channel can be estimated from these illustrations. Typical cross sections at selected locations, together with the water surface elevation and lateral extent of the design floods, are shown on Plates 31 through 33.

Obstructions - During flooding conditions, debris can collect on bridges and culverts, thereby decreasing their carrying capacity and causing greater water depths (backwater effect) upstream of the structures. Since the occurrence and amount of debris are indeterminate factors, only the physical characteristics of the structures were considered in preparing profiles of the Floodway Design, Flood Hazard Area Design, and Standard Project Floods. Similarly, the maps of flooded areas show the backwater effect of obstructive bridges and culverts, but do not reflect increased water surface elevation that could be caused by debris collecting against the structures, or by deposition of silt in the stream channel under structures. As previously indicated, there are 5 dams within the study area that have no flood control capacities and will not seriously alter the flow characteristics of floodwaters. Of the 51 bridges crossing Shabakunk Creek, West Branch Shabakunk Creek, and Little Shabakunk Creek, 41 are obstructive to the Floodway Design Flood, 46 are obstructive to the Flood Hazard Area Design Flood and 48 are obstructive to the Standard Project Flood. Table 6 shows water surface elevations for all three design floods at the bridges.

Velocities of flow - During floods, water is forced to pass over lands not normally inundated, causing a wide range of velocities to occur. The water flowing in the deeper portions of the stream channel will be faster than in the more shallow overbank areas. Velocities of flow will also vary from one location upstream to the next area downstream as stream characteristics change. Some important factors are changes in bed slope, size and shape of channel and overbank areas, vegetation cover, materials composing the stream bed, and increased volumes of water to be carried by the stream possibly coming from tributaries, or

direct storm runoff. Soil may be eroded by velocities greater than 2 feet per second while debris and silt will be deposited at slower velocities. For the same location, it is possible to have severe erosion of the stream banks occur simultaneously with deposition of alluvial soils on the flood plain.

TABLE 6

ELEVATION DATA

Bridges Across Shabakunk, West Branch Shabakunk, and Little Shabakunk Creeks

Identification	Mileage Above Mouth	Under-clearance Elev.[a]	Water Surface Elevation		
			Floodway Design Flood[b]	Flood Hazard Area Design Flood[b]	Standard Project Flood[b]
		Feet-m.s.l.d.	Feet-m.s.l.d.	Feet-m.s.l.d.	Feet-m.s.l.d.
Shabakunk Creek					
Box culvert: Delaware and Raritan Canal, Penn Central R.R., New Jersey Rte. 147	0.26	46.1	50.6	51.6	55.8
Brunswick Pike (U.S. Rte. 1)	0.91	54.2	53.7	54.2	58.7
Footbridge	1.40	54.1	57.0	58.0	61.6
Princeton Pike (N.J. Rte. 583)	1.46	57.1	57.3	59.2	63.0
Lawrenceville Rd. (U.S. Rte. 206)	1.72	57.4	61.2	62.0	65.4
Reading R.R.	3.12	71.2	73.4	73.6	74.8
Parkside Ave.	3.57	72.0	75.7	76.4	78.0
Green Lane	4.47	80.7	83.3	83.9	85.9
Ewingville Rd.	5.27	93.9	94.2	95.0	97.7
Private Farm Rd.	5.63	100.4	101.7	102.3	104.4
Bull Run Rd.	6.14	111.9	112.1	113.0	114.4[d]
West Branch Shabakunk Creek					
Spruce St.	0.40	64.6	64.2	64.7	66.5
Footbridge	0.48	64.8	65.5	66.1	68.8
Footbridge	0.57	64.9	67.3	68.3	69.3
Private Driveway	0.67	67.4	68.9	69.4	70.4
Olden Ave.	0.79	67.7	69.6	71.4	72.9
Reading R.R.	0.93	70.5	71.6	72.4	73.7
Prospect St.	1.17	72.8	73.6	74.5	76.4
Parkside Ave.	1.62	76.4	80.0	80.1	82.1
Box culvert (Shopping Center)	1.63	80.9	80.1	80.3	82.3
Private Driveway	1.75	80.0	80.7	81.4	82.8

TABLE 6 (Continued)

ELEVATION DATA

Bridges Across Shabakunk, West Branch Shabakunk, and Little Shabakunk Creeks

Identification	Mileage Above Mouth	Under-clearance Elev.[a]	Water Surface Elevation		
			Floodway Design Flood[b]	Flood Hazard Area Design Flood[b]	Standard Project Flood[b]
		Feet-m.s.l.d.	Feet-m.s.l.d.	Feet-m.s.l.d.	Feet-m.s.l.d.
West Branch Shabakunk Creek (Continued)					
Pennington Ave. (N.J. Rte. 31)	1.82	83.3	82.7	84.5	86.1
Olden Ave.	2.15	83.4	85.0	85.4	87.1
Thurston Ave.	2.32	85.0	85.3	86.7	87.2
Central Ave.	2.56	89.3	88.3	89.9	90.4
Footbridge	2.68	89.2	88.7	90.6	91.4
Stratford Ave.	3.30	100.2	100.4	101.1	102.5
Lower Ferry Rd.	3.52	103.8	105.6	106.6	107.5
Carlton Ave.	4.02	112.9	113.6	114.4	114.9
Culvert (Upper Ferry Rd.)	4.89	148.5	145.7[c]	146.1[c]	146.6[c]
Culvert (Scotch Rd.)	5.02	159.7	157.2	157.8	159.0
Reading R.R.	5.04	160.8	159.0	159.4	159.8
Upper Ferry Rd.	5.06	160.3	159.0[d]	159.5[d]	160.0[d]
Little Shabakunk Creek					
Delaware & Raritan Canal Aquaduct	0.03	45.8	52.6	54.2	56.8
U.S. Rte. 1 Northbound (Culvert under Construction)	0.32	51.1	52.7	54.3	56.8
U.S. Rte. 1 Southbound & N.J. Rte. 147 (Culvert under Construction)	0.36	51.4	52.9	54.5	56.9
Footbridge	1.31	62.3	62.5	63.2	63.5
Princeton Pike (N.J. Rte. 583)	1.35	62.9	65.5	66.0	67.0
Balsa Dr.	1.68	67.8	70.0	70.1	70.9
Golf Course - Footbridge	1.91	72.0	72.4	72.9	73.8
Golf Course - Footbridge	1.95	72.8	74.9	75.6	76.9

TABLE 6 (Continued)

ELEVATION DATA

Bridges Across Shabakunk, West Branch Shabakunk, and Little Shabakunk Creeks

Identification	Mileage Above Mouth	Under-clearance Elev.[a]	Water Surface Elevation		
			Floodway Design Flood[b]	Flood Hazard Area Design Flood[b]	Standard Project Flood[b]
		Feet-m.s.l.d.	Feet-m.s.l.d.	Feet-m.s.l.d.	Feet-m.s.l.d.
Little Shabakunk Creek (Continued)					
Footbridge (End of Vander Veer Dr.)	1.99	73.4	76.6	77.1	78.2
Private Driveway	2.37	74.9	77.7	78.2	79.3
Private Footbridge	2.46	77.5	80.1	80.5	81.1
Private Footbridge	2.50	78.1	80.6	81.1	81.9
Lawrenceville Rd. (U.S. Rte. 206)	2.54	77.6	81.9	82.4	83.1
Culvert (Rider College Driveway)	3.04	87.6	90.8	91.2	91.7
Footbridge - Rider College	3.08	90.5	90.8	91.2	91.7
Culvert (Rider College Walkway)	3.22	92.2	93.2	93.8	94.4
Culvert (Rider College Driveway)	3.30	93.7	96.6	97.6	98.0
Reading R.R.	3.39	99.6	96.6	97.6	98.0
Culvert (Rider College Driveway)	3.43	93.7	96.6[d]	97.6[d]	98.0[d]

[a] Centerline face of stream.
[b] Upstream face of structure.
[c] Downstream side of culvert.
[d] Downstream side of bridge.

Table 7 lists average velocities which would occur during peak flows for the Floodway Design Flood, Flood Hazard Area Design Flood, and Standard Project Flood. Generally, the velocities which would occur during a Standard Project Flood are faster because the volume of water which must be carried by the stream is greater than that for a Floodway Design Flood or Flood Hazard Area Design Flood.

Rates of rise and duration - Intense rainfalls that accompany hurricanes usually produce the floods occurring on Shabakunk Creek, West Branch Shabakunk Creek, and Little Shabakunk Creek. The stream channels contain flows for varying time intervals before overbank flooding occurs. Once overbank flooding occurs, the water rises at a rate of about

TABLE 7

MAXIMUM AVERAGE VELOCITIES [a]

Shabakunk, West Branch Shabakunk, and Little Shabakunk Creeks

Location	Mileage Above Mouth	Floodway Design Flood		Flood Hazard Area Design Flood		Standard Project Flood	
		Channel	Overbank[b]	Channel	Overbank[b]	Channel	Overbank[b]
		Feet per Second		Feet per Second		Feet per Second	
Shabakunk Creek							
Cross Section F	1.56	4.6	0.5	4.6	0.6	4.2	0.6
Downstream of confluence with West Branch Shabakunk Creek	2.18	9.1	0.7	9.3	0.8	7.1	0.8
Cross Section Number:							
4	2.86	8.9	1.2	9.7	2.0	11.2	1.0
8	3.55	4.5	0.4	4.8	0.5	6.2	0.7
13	4.29	2.8	0.3	3.0	0.3	3.8	0.4
20	5.26	3.2	0.6	3.4	0.8	4.1	1.2
27	6.13	5.6	0.6	6.4	0.7	13.3	1.4
West Branch Shabakunk Creek							
12	1.03	4.9	0.8	4.7	0.9	4.6	0.9
23	2.01	3.0	1.1	2.7	1.0	2.4	0.9
25	2.20	3.4	1.2	3.7	1.4	3.7	1.2
Little Shabakunk Creek							
Cross Section Number:							
5	1.05	9.2	1.3	9.5	1.4	10.7	1.7
6	2.03	3.3	0.4	3.5	0.5	3.9	0.5
7	2.93	4.0	0.7	4.3	0.7	4.7	0.8

[a] In reaches unaffected by bridges or other channel constrictions.

[b] Value given is the greater of the left and right overbank velocity.

1 to 2 feet per hour. Floodwaters can remain out of banks for time periods up to 1-1/2 days. Table 8 gives the maximum rate of rise (above critical stage), height of rise (from critical stage to maximum flood level), time of rise (time period corresponding to height of rise), and duration of critical stage (period of time flooding is above critical stage level) for the Standard Project Flood at various locations.

TABLE 8

RATES OF RISE AND DURATION
Standard Project Flood

Location	Maximum Rate of Rise Ft./Hr.	Height of Rise Ft.	Time of Rise Hrs.	Duration of Critical Stage Hrs.
Shabakunk Creek				
Between Princeton Pike and Lawrenceville Road	1.8	10.8	13	35
West Branch Shabakunk Creek				
Between Parkside Avenue and Pennington Avenue	1.8	3.3	4	14
Little Shabakunk Creek				
Between Balsam Drive and Lawrenceville Road	1.1	8.1	16	30

Photographs, future flood heights - The levels that the Floodway Design, Flood Hazard Area Design, and Standard Project Floods are expected to reach at various locations along Shabakunk Creek, West Branch Shabakunk Creek, and Little Shabakunk Creek are indicated on the following photographs.

Figure 6 - Future flood heights on Shabakunk Creek at the Westgate Apartments near Lawrenceville Road (U.S. Rte. 206).

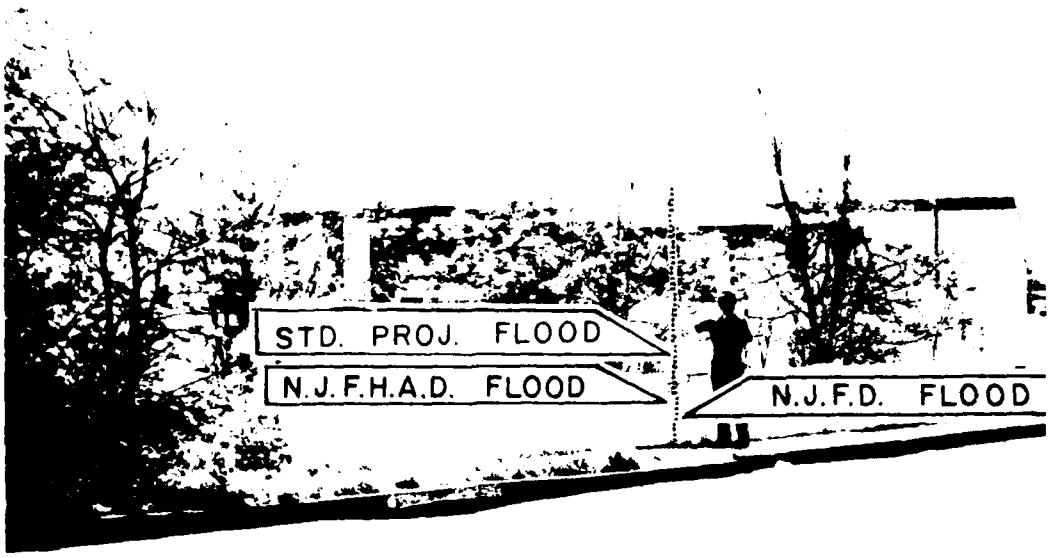


Figure 7 - Future flood heights on Shabakunk Creek at the Parkside Avenue bridge.

Figure 8 - Future flood heights on Little Shabakunk Creek at the Princeton Pike bridge (N.J. Rte. 583)

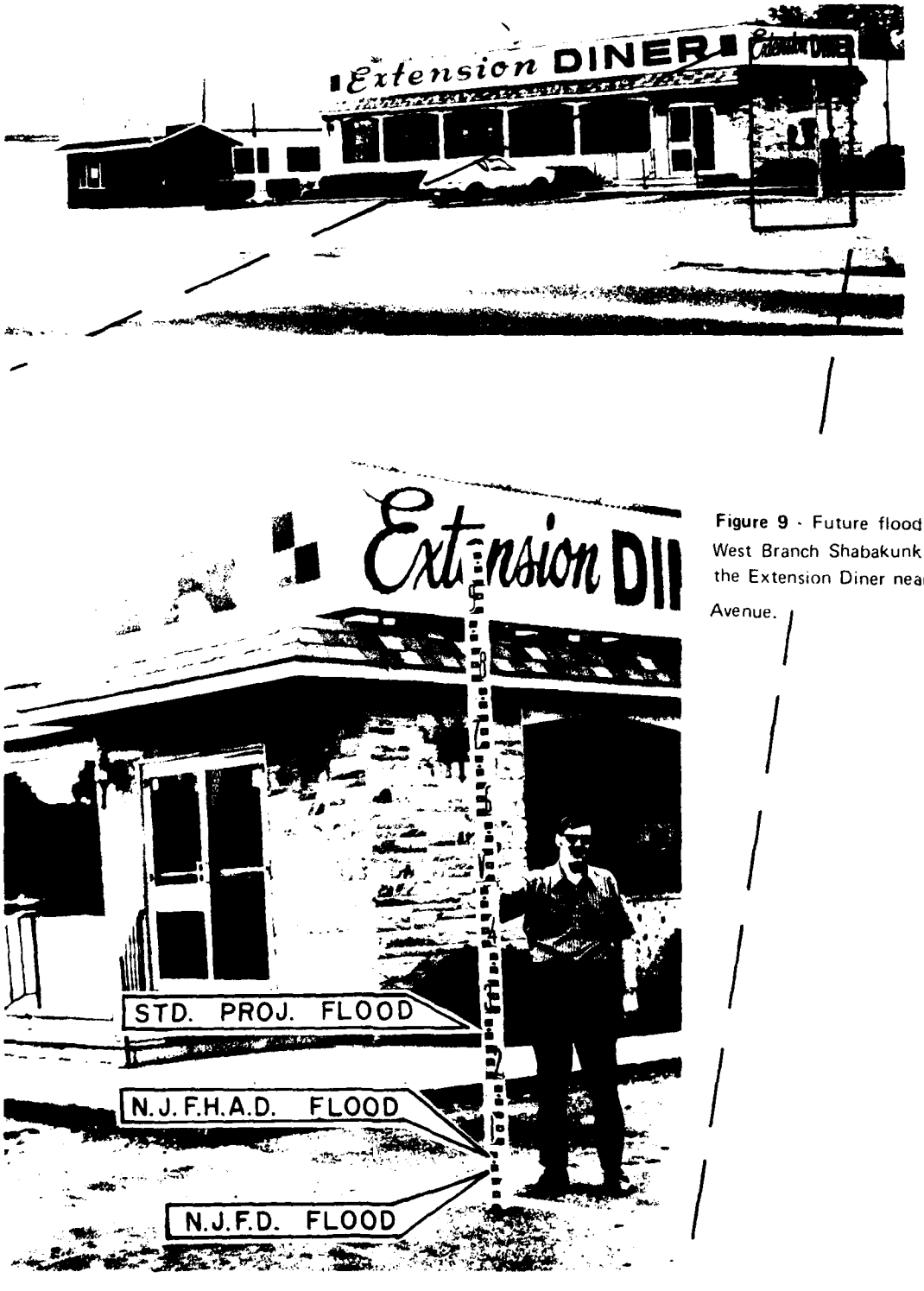


Figure 9 - Future flood heights on West Branch Shabakunk Creek at the Extension Diner near Parkside Avenue.

GLOSSARY

Backwater. The resulting high water surface in a given stream due to a downstream obstruction or high stages in an intersecting stream.

Flood. An overflow of lands not normally covered by water and that are used or usable by man. Floods have two essential characteristics: The inundation of land is temporary; and the land is adjacent to and inundated by overflow from a river, stream, ocean, lake, or other body of standing water.

Normally a "flood" is considered as any temporary rise in streamflow or stage, but not the ponding of surface water, that results in significant adverse effects in the vicinity. Adverse effects may include damages from overflow of land areas, temporary backwater effects in sewers and local drainage channels, creation of unsanitary conditions or other unfavorable situations by deposition of materials in stream channels during flood recessions, rise of ground water coincident with increased streamflow, and other problems.

Flood Crest. The maximum stage or elevation reached by the waters of a flood at a given location.

Flood Hazard Area Design Flood. A flood greater than the Floodway Design Flood that inundates the Floodway and additional portions of the flood plain. This area is known as the Flood Hazard Area. The Floodway (see Floodway Design Flood) is an integral part of the Flood Hazard Area. This flood is also used extensively by the State of New Jersey for planning purposes.

Flood Plain. The areas adjoining a river, stream, watercourse, ocean, lake, or other body of standing water that have been or may be covered by floodwater.

Flood Profile. A graph showing the relationship of water surface elevation to location, the latter generally expressed as distance above mouth for a stream of water flowing in an open channel. It is generally drawn to show surface elevation for the crest of a specific flood, but may be prepared for conditions at a given time or stage.

Flood Stage. The stage or elevation at which overflow of the natural banks of a stream or body of water begins in the reach or area in which the elevation is measured.

Floodway Design Flood. A flood that inundates the channel and portions of the adjacent flood plain necessary for the reasonable passage of flood waters. This area is known as the Floodway and represents the minimum area of the flood plain required for passage of flood waters without aggravating flood conditions upstream or downstream. This flood is used extensively by the State of New Jersey for planning purposes. In the hydrologic region that includes the Shabakunk Creek Watershed, the Floodway Design Flood is equivalent to an event having an average recurrence interval of once in 100 years. (See also: Flood Hazard Area Design Flood).

Hurricane. An intense cyclonic windstorm of tropical origin in which winds tend to spiral inward in a counterclockwise direction toward a core of low pressure, with maximum surface wind velocities that equal or exceed 75 miles per hour (65 knots) for several minutes or longer at some points. Tropical storm is the term applied if maximum winds are less than 75 miles per hour.

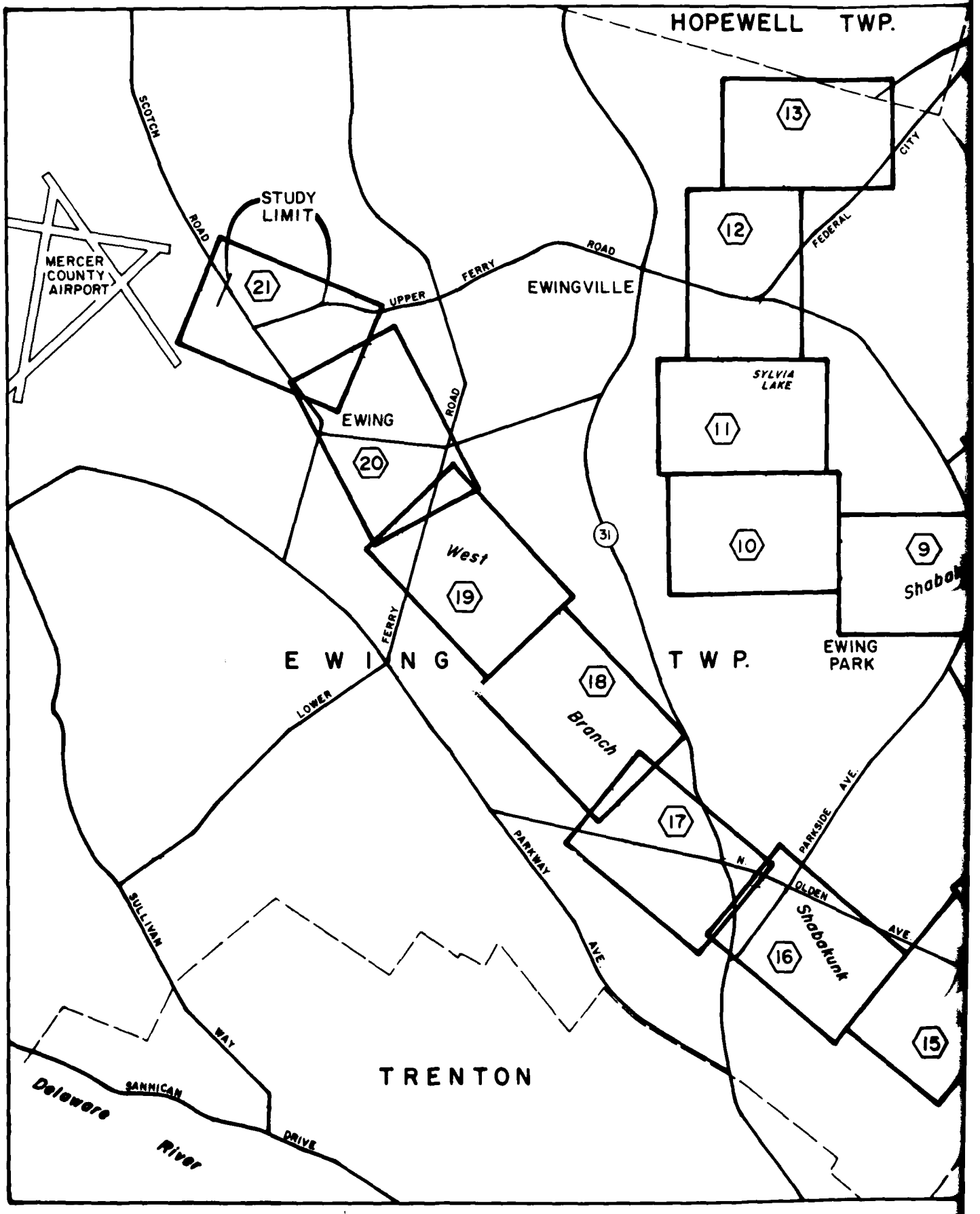
Hydrograph. A graph showing flow values against time at a given point, usually measured in cubic feet per second. The area under the curve indicates total volume of flow.

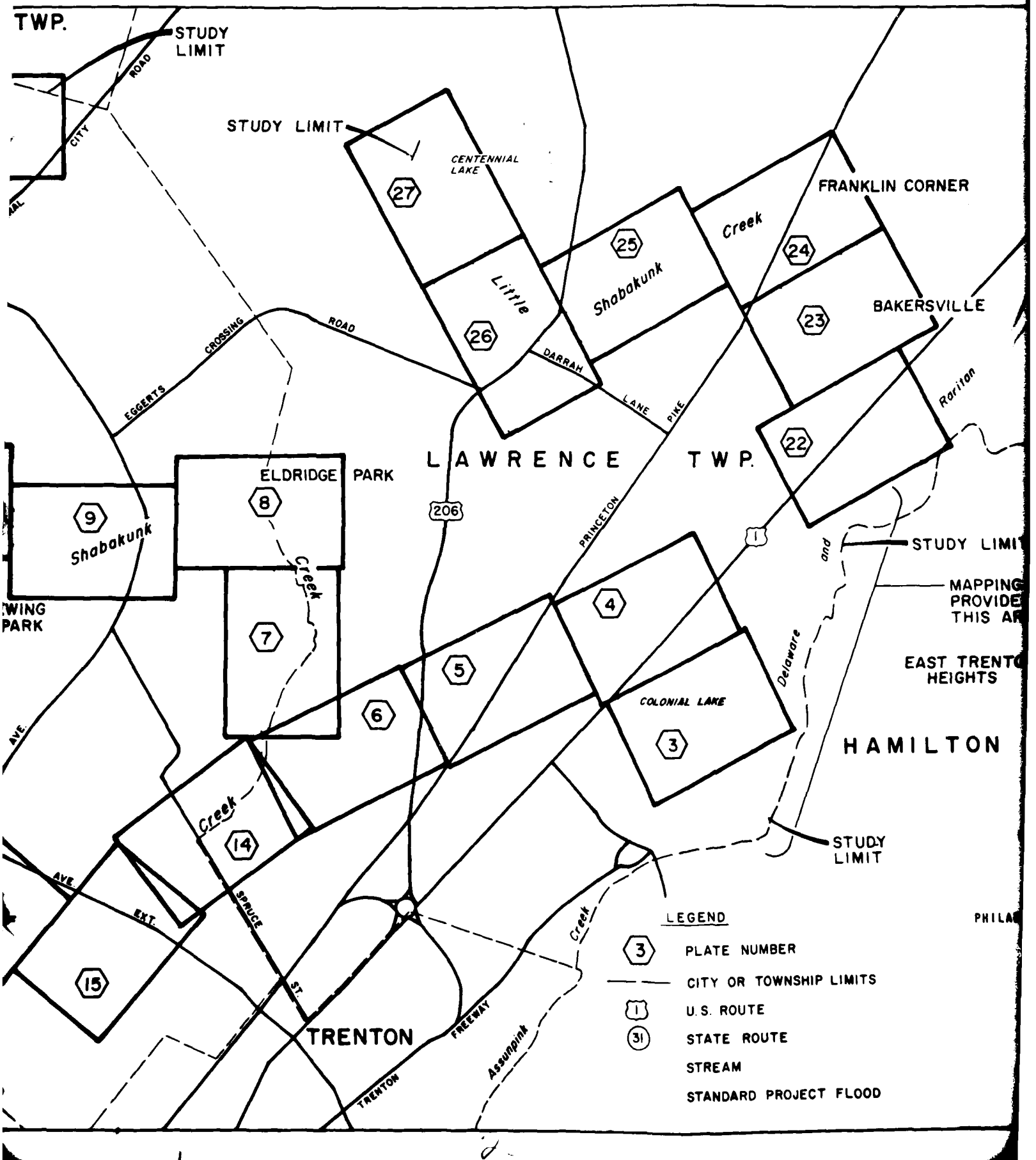
Left Bank. The bank on the left side of a river, stream, or watercourse, looking downstream.

Right Bank. The bank on the right side of a river, stream, or watercourse, looking downstream.

Standard Project Flood. The flood that may be expected from the most severe combination of meteorological and hydrological conditions that are considered reasonably characteristic of the geographical area in which the drainage basin is located, excluding extremely rare combinations. Peak discharges for these floods are generally about 40-60 percent of the Probable Maximum Floods for the same basins. As used by the Corps of Engineers, Standard Project Floods are intended as practicable expressions of the degree of protection that should be sought in the design of flood control works, the failure of which might be disastrous.

Underclearance Elevation. The elevation at the top of the opening of a culvert, or other structure through which water may flow along a water course.


HOPEWELL TWP.
SCOTCH ROAD
STUDY LIMIT
MERCER COUNTY AIRPORT
21
UPPER FERRY ROAD
EWINGVILLE
13
CITY
12
FEDERAL
SYLVIA LAKE
11
EWING
ROAD
20
West
19
31
10
9
Shaba
FERRY
E W I N G
T W P.
EWING PARK
18
Branch
LOWER
17
PARKWAY
N.
PARKSIDE AVE.
OLDEN AVE.
Shabakunk
16
15
SULLIVAN WAY
AVE.
TRENTON
SANNICAN DRIVE
Delaware River


TWP.
STUDY LIMIT
ROAD
CITY
STUDY LIMIT
CENTENNIAL LAKE
27
Little
Shabakunk
25
Creek
FRANKLIN CORNER
24
BAKERSVILLE
23
26
DARRAH
LANE
PIKE
CROSSING
ROAD
EGGERTS
LAWRENCE TWP.
ELDRIDGE PARK
9
Shabakunk
8
206
PRINCETON
22
Raritan
1
STUDY LIMIT
and
MAPPING PROVIDED THIS AR
Creek
7
4
5
6
Delaware
EAST TRENTON HEIGHTS
COLONIAL LAKE
3
HAMILTON
AVE.
Creek
14
AVE.
EXT.
SPRUCE
ST.
15
TRENTON
FREEWAY
Assunpink
Creek
TRENTON
STUDY LIMIT
PHILA
LEGEND
3 PLATE NUMBER
CITY OR TOWNSHIP LIMITS
1 U.S. ROUTE
31 STATE ROUTE
STREAM
STANDARD PROJECT FLOOD

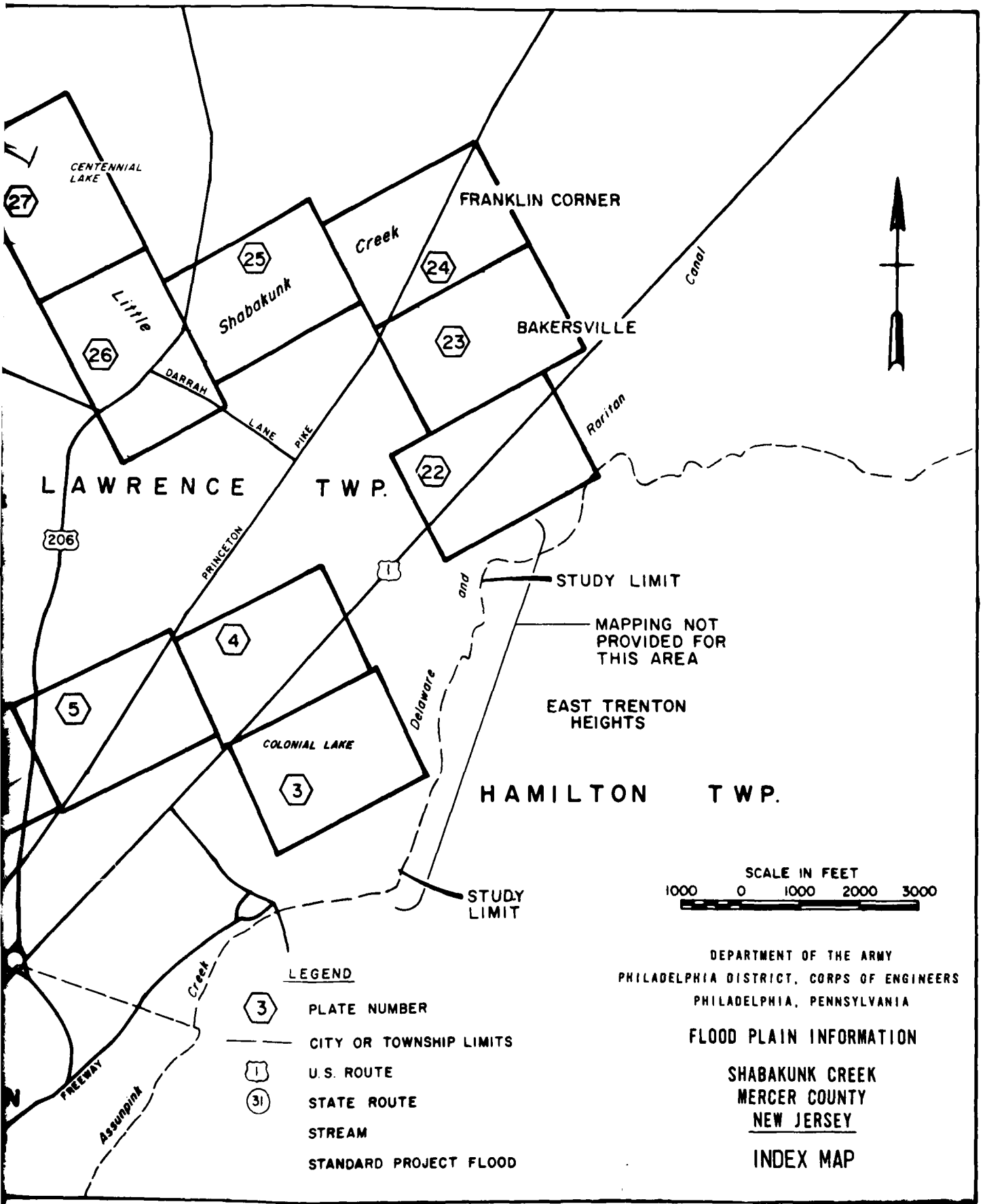
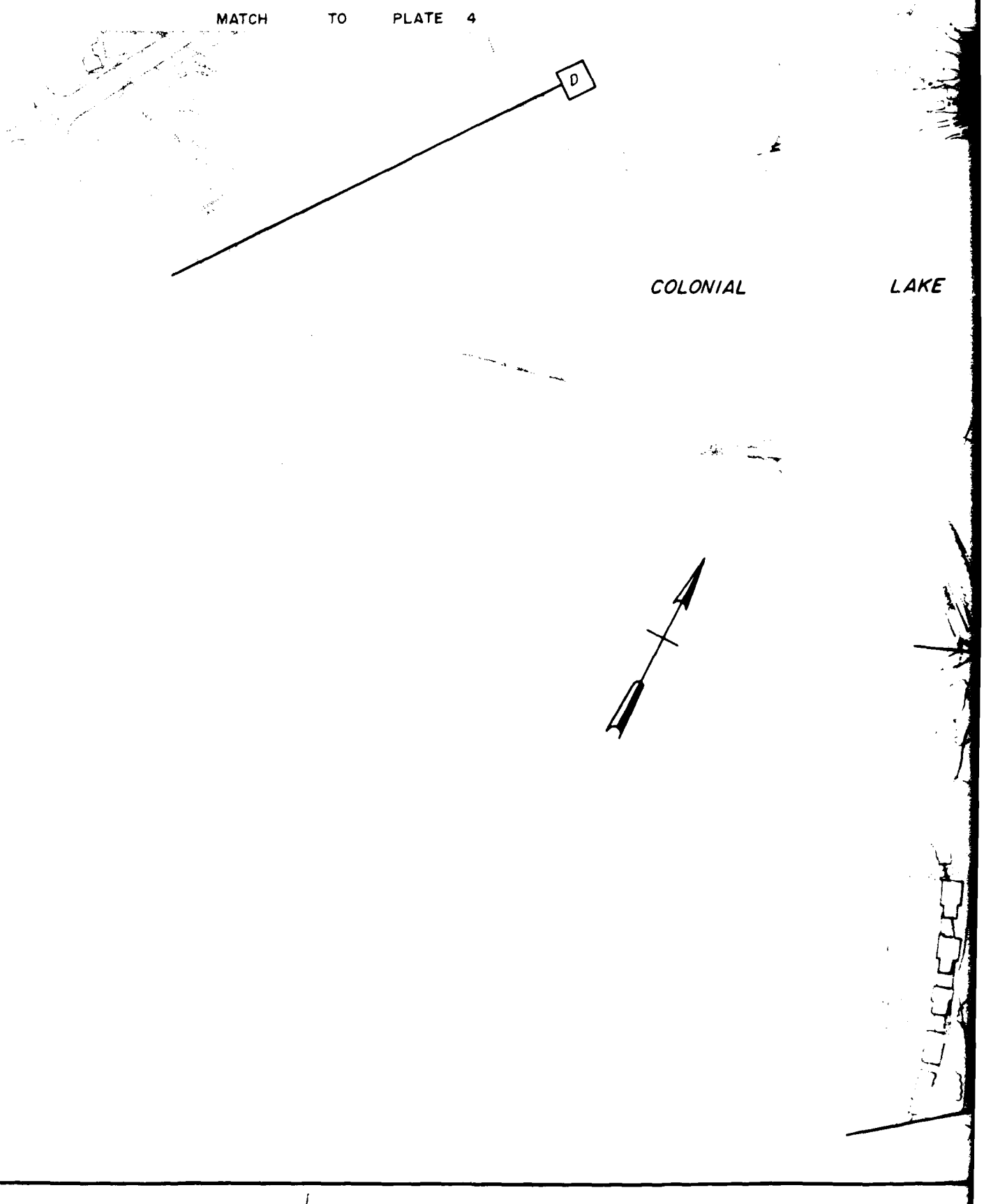
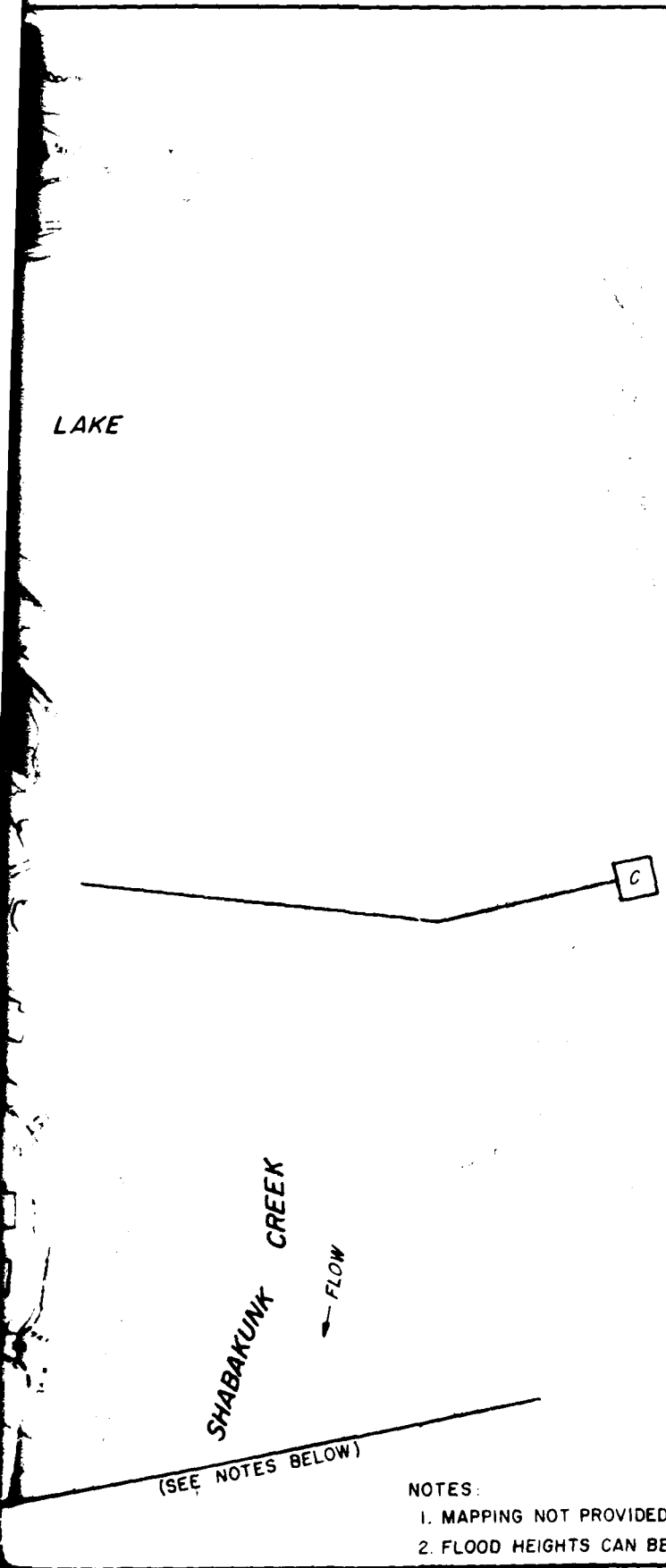

CENTENNIAL LAKE
27
Little
26
25
Shabakunk
Creek
24
FRANKLIN CORNER
Canal
23
BAKERSVILLE
DARRAH
LANE
PIKE
Raritan
22
LAWRENCE TWP.
206
PRINCETON
1
and
STUDY LIMIT
MAPPING NOT PROVIDED FOR THIS AREA
4
5
Delaware
EAST TRENTON HEIGHTS
COLONIAL LAKE
3
HAMILTON TWP.
STUDY LIMIT
SCALE IN FEET
1000 0 1000 2000 3000
Creek
FREEWAY
Assunpink
LEGEND
3 PLATE NUMBER
CITY OR TOWNSHIP LIMITS
1 U.S. ROUTE
31 STATE ROUTE
STREAM
STANDARD PROJECT FLOOD
DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA
FLOOD PLAIN INFORMATION
SHABAKUNK CREEK
MERCER COUNTY
NEW JERSEY
INDEX MAP

PLATE 2


MATCH TO PLATE 4
D
COLONIAL
LAKE



NOTES:

1. MAPPING NOT PROVIDED FOR THIS AREA
2. FLOOD HEIGHTS CAN BE OBTAINED FROM PROFILE PLATE 28.

L

OVERF

N.J.
DESI
FLOOD

D — CROSS

GROUN
SEA L

NOTES

1. MAPS BASED ON TOPO
MERCER COUNTY, N.J.
2. LIMITS OF OVERFLOW
ACTUAL LOCATION ON
THE REPORT.
3. AREAS OUTSIDE THE
SUBJECT TO FLOODI
4. MINIMUM COUNTOUR

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DEPARTMEN
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PHILADELPH

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SHAB

LEGEND

OVERFLOW LIMITS

N.J. FLOODWAY	STANDARD
DESIGN	PROJECT
FLOOD	FLOOD

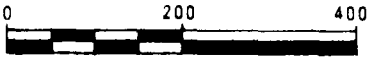
D — CROSS SECTION

GROUND ELEVATION IN FEET
SEA LEVEL DATUM

NOTES

1. MAPS BASED ON TOPOGRAPHIC MAPS SUPPLIED BY MERCER COUNTY, N.J.
2. LIMITS OF OVERFLOW SHOWN MAY VARY FROM ACTUAL LOCATION ON GROUND AS EXPLAINED IN THE REPORT.
3. AREAS OUTSIDE THE FLOOD PLAIN MAY BE SUBJECT TO FLOODING FROM LOCAL RUNOFF.
4. MINIMUM COUNTOUR INTERVAL IS 2 FT.

SCALE IN FEET



C

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

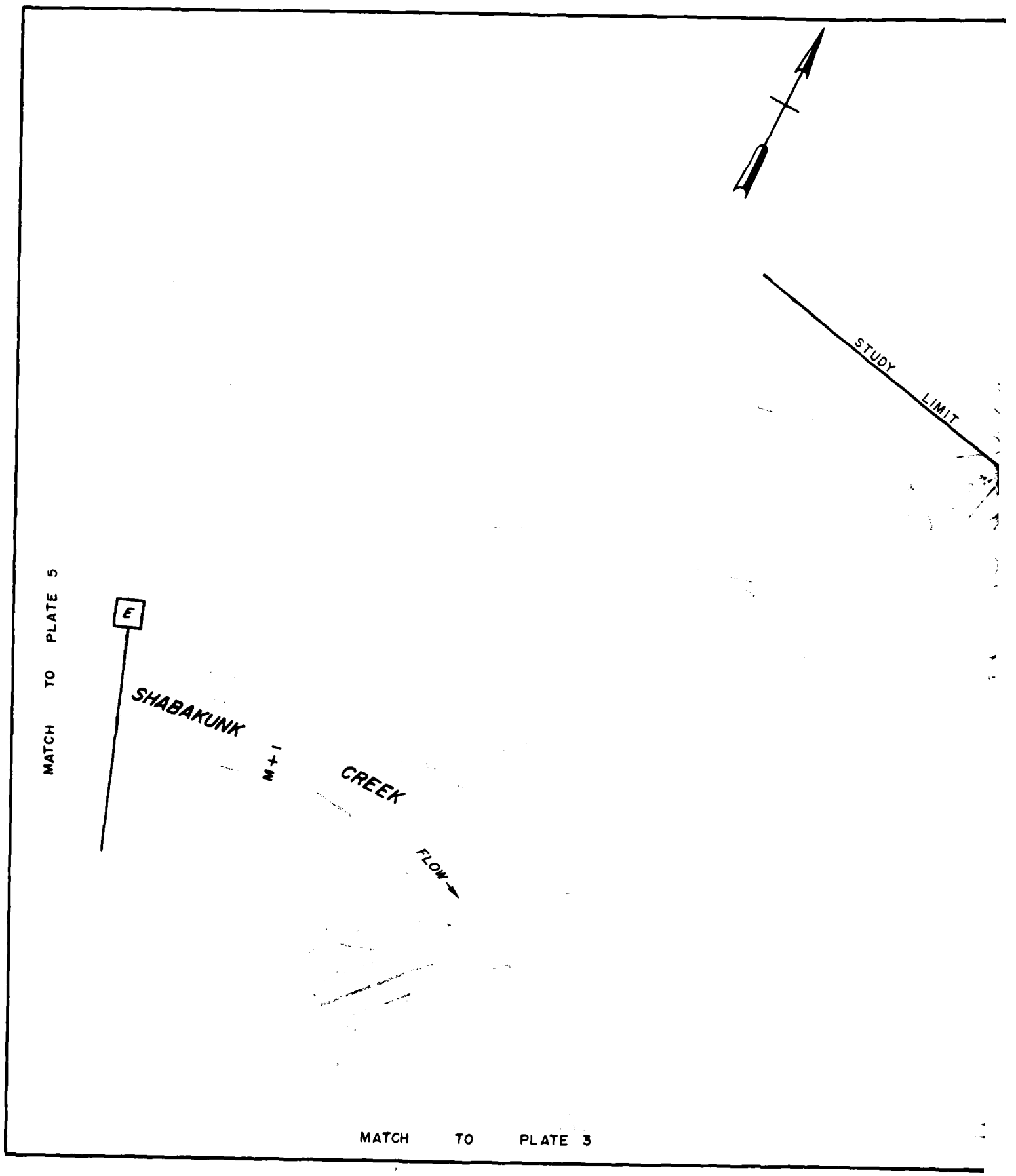
FLOOD PLAIN INFORMATION

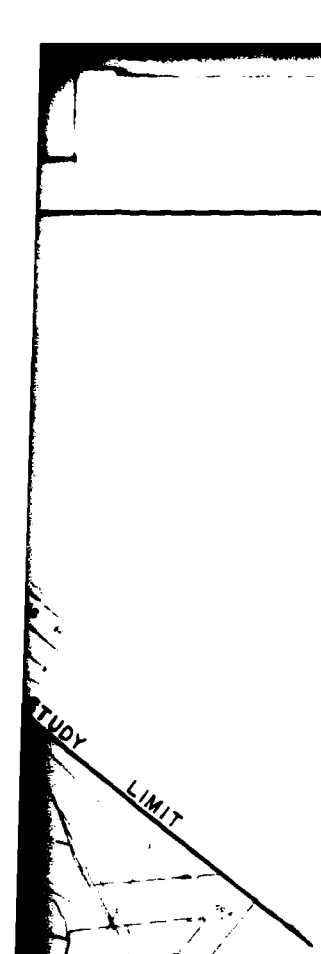
SHABAKUNK CREEK
MERCER COUNTY
NEW JERSEY

FLOODED AREAS
SHABAKUNK CREEK

G NOT PROVIDED FOR THIS AREA
HEIGHTS CAN BE OBTAINED FROM PROFILE PLATE 28.

PLATE 3


STUDY LIMIT
E
SHABAKUNK CREEK
M+I
FLOW
MATCH TO PLATE 5
MATCH TO PLATE 3



M+I

E

NOTES

1. MAPS BASED O
MERCER COUNT

2. LIMITS OF OV
ACTUAL LOCAT
THE REPORT.

3. AREAS OUTSI
SUBJECT TO I

4. MINIMUM COV

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PHIL

FLO

LEGEND

OVERFLOW LIMITS

N.J. FLOODWAY	STANDARD
DESIGN	PROJECT
FLOOD	FLOOD

M+1 MILES ABOVE MOUTH

E CROSS SECTION

GROUND ELEVATION IN FEET
SEA LEVEL DATUM

U.S. ROUTE

NOTES

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2. LIMITS OF OVERFLOW SHOWN MAY VARY FROM ACTUAL LOCATION ON GROUND AS EXPLAINED IN THE REPORT.
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4. MINIMUM COUNTOUR INTERVAL IS 2 FT.

SCALE IN FEET

0 200 400

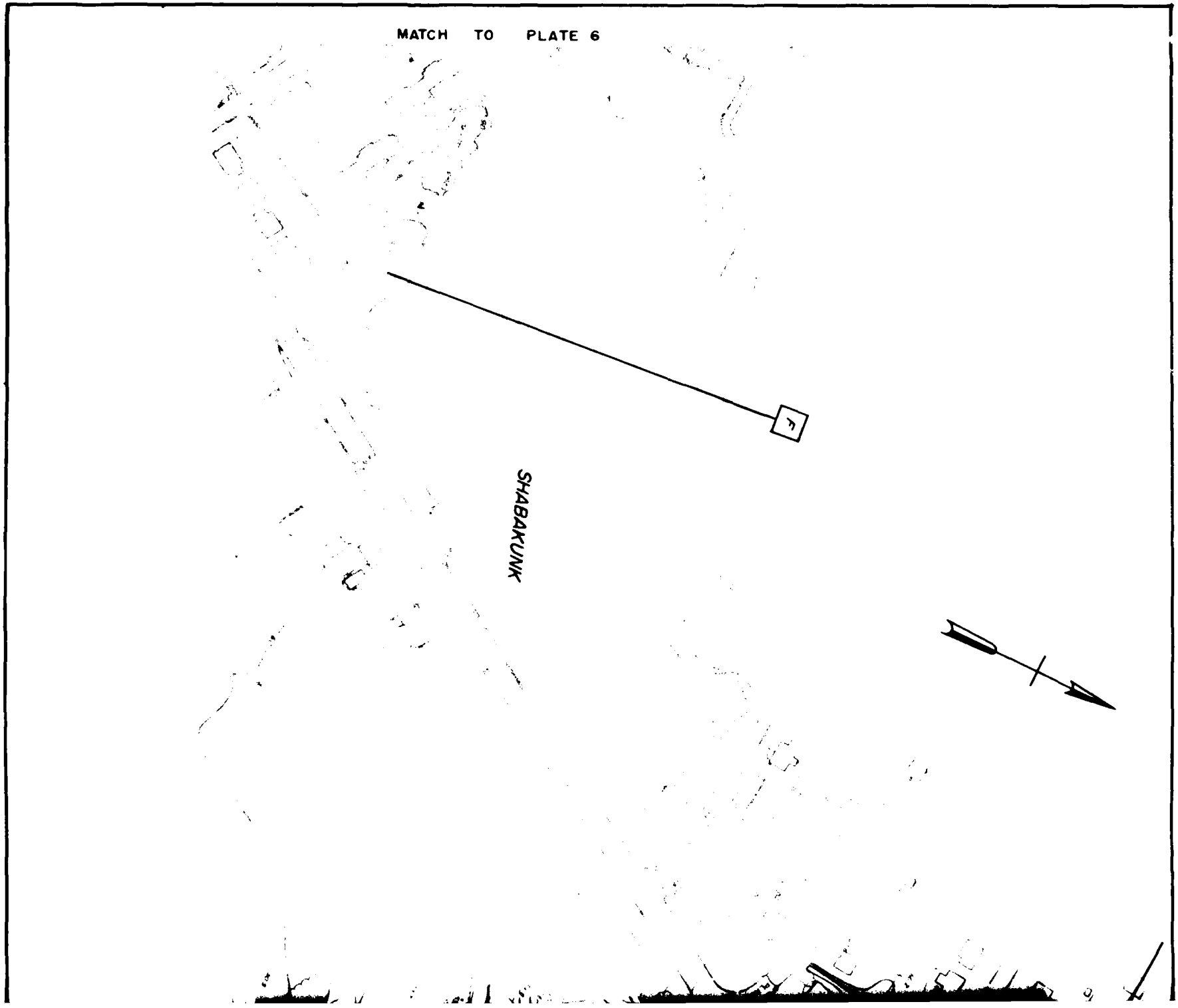
DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

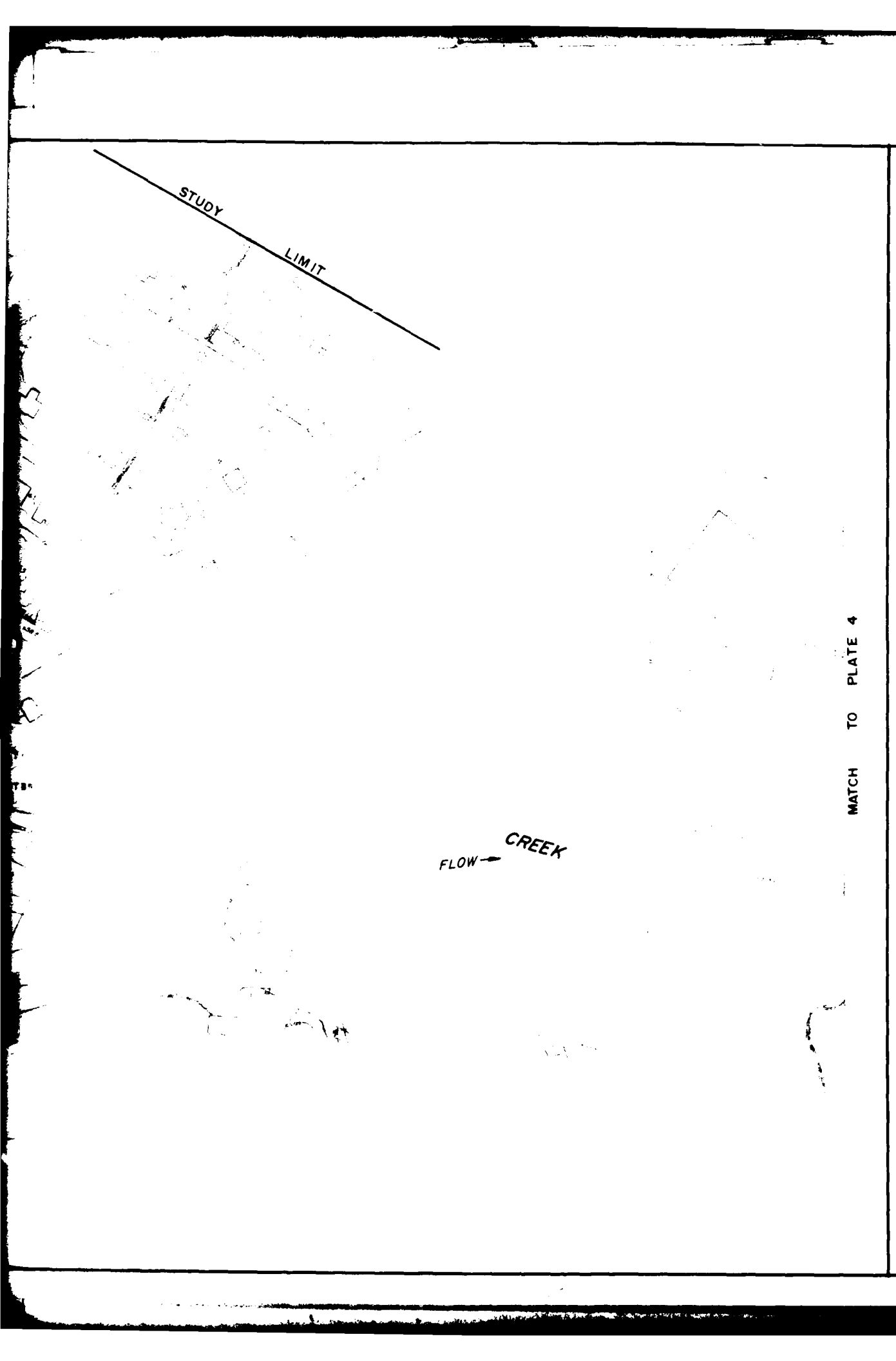
FLOOD PLAIN INFORMATION

SHABAKUNK CREEK
MERCER COUNTY
NEW JERSEY

FLOODED AREAS
SHABAKUNK CREEK

PLATE 4


MATCH TO PLATE 6
SHABAKUNK



NOTES

1. MAPS BASED ON
MERCER COUNTY,

2. LIMITS OF OVE
ACTUAL LOCATI
THE REPORT.

3. AREAS OUTSIDE
SUBJECT TO FL

4. MINIMUM COUNT

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PHILAD

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S

MATCH TO PLATE 4

FLOW → CREEK

LEGEND

OVERFLOW LIMITS

N.J. FLOODWAY	STANDARD
DESIGN	PROJECT
FLOOD	FLOOD

F — CROSS SECTION

GROUND ELEVATION IN FEET
SEA LEVEL DATUM

NOTES

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4. MINIMUM COUNTOUR INTERVAL IS 2 FT.

SCALE IN FEET

0 200 400

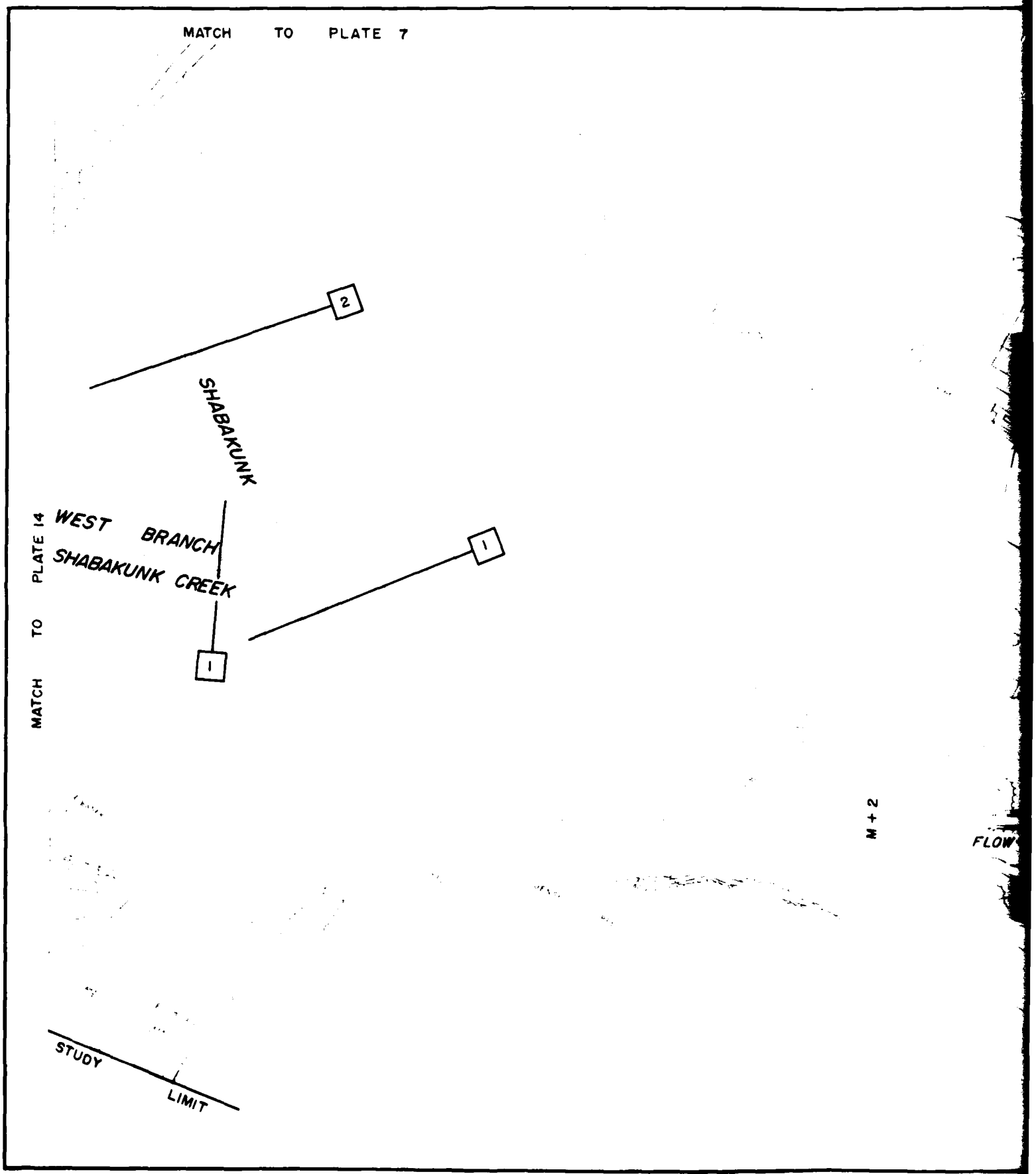
DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

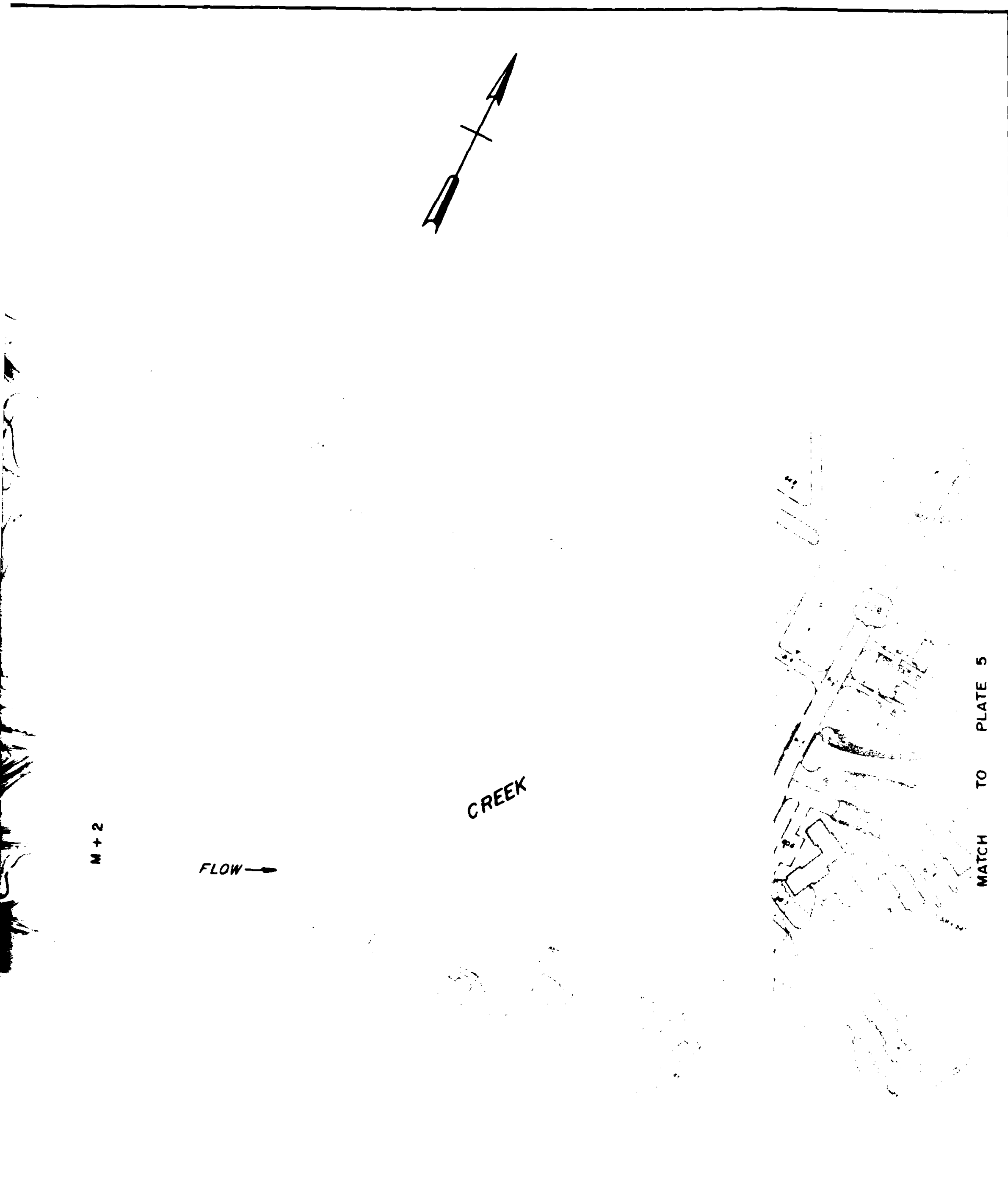
FLOOD PLAIN INFORMATION

SHABAKUNK CREEK
MERCER COUNTY
NEW JERSEY

FLOODED AREAS
SHABAKUNK CREEK

PLATE 5


MATCH TO PLATE 7
2
SHABAKUNK
WEST BRANCH
SHABAKUNK CREEK
1
1
MATCH TO PLATE 14
M+2
FLOW
STUDY
LIMIT



M+2

2

NOTES

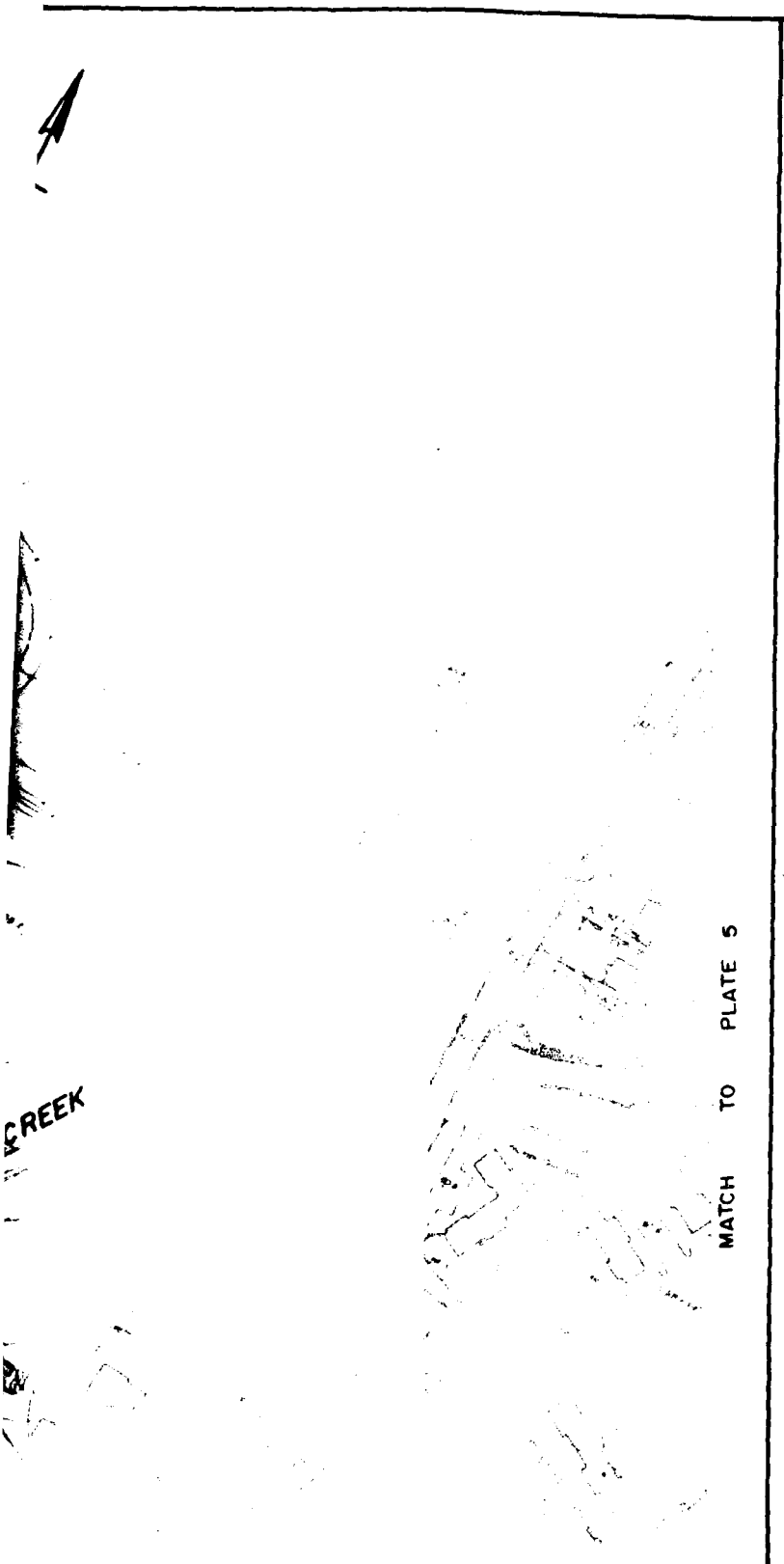
1. MAPS
MERCE

2. LIMIT
ACTUA
THE

3. AREAS
SUBJE

4. MINI

PHILAD



LEGEND

OVERFLOW LIMITS

N.J. FLOODWAY	STANDARD PROJECT FLOOD
DESIGN	
FLOOD	

M+2 MILES ABOVE MOUTH

2 CROSS SECTION

GROUND ELEVATION IN FEET SEA LEVEL DATUM

U. S. ROUTE

NOTES

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2. LIMITS OF OVERFLOW SHOWN MAY VARY FROM ACTUAL LOCATION ON GROUND AS EXPLAINED IN *THE REPORT*.
3. AREAS OUTSIDE THE FLOOD PLAIN MAY BE SUBJECT TO FLOODING FROM LOCAL RUNOFF.
4. MINIMUM COUNTOUR INTERVAL IS 2 FT.

SCALE IN FEET

0 200 400

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

FLOOD PLAIN INFORMATION

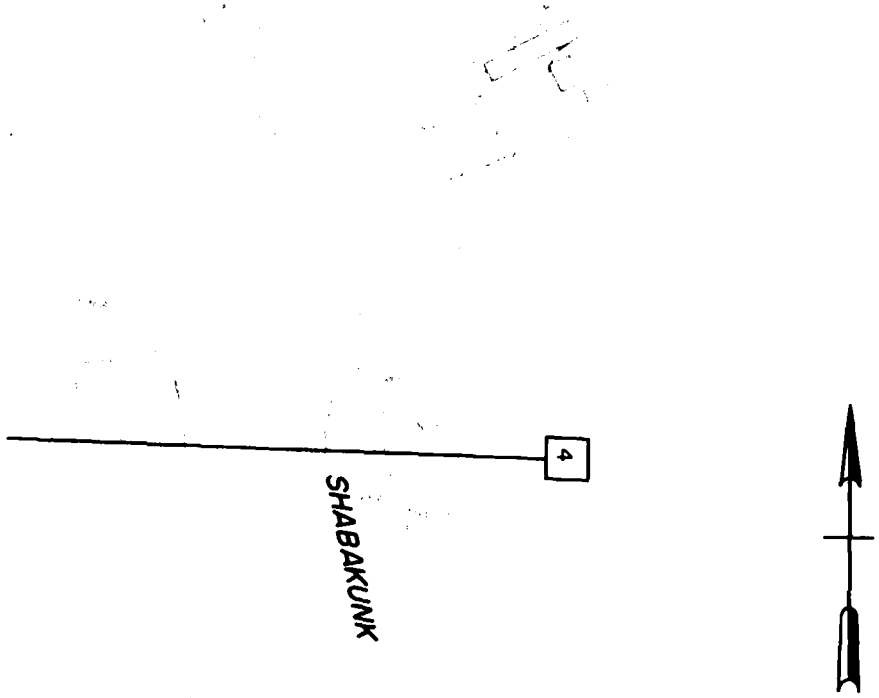
SHABAKUNK CREEK
MERCER COUNTY
NEW JERSEY

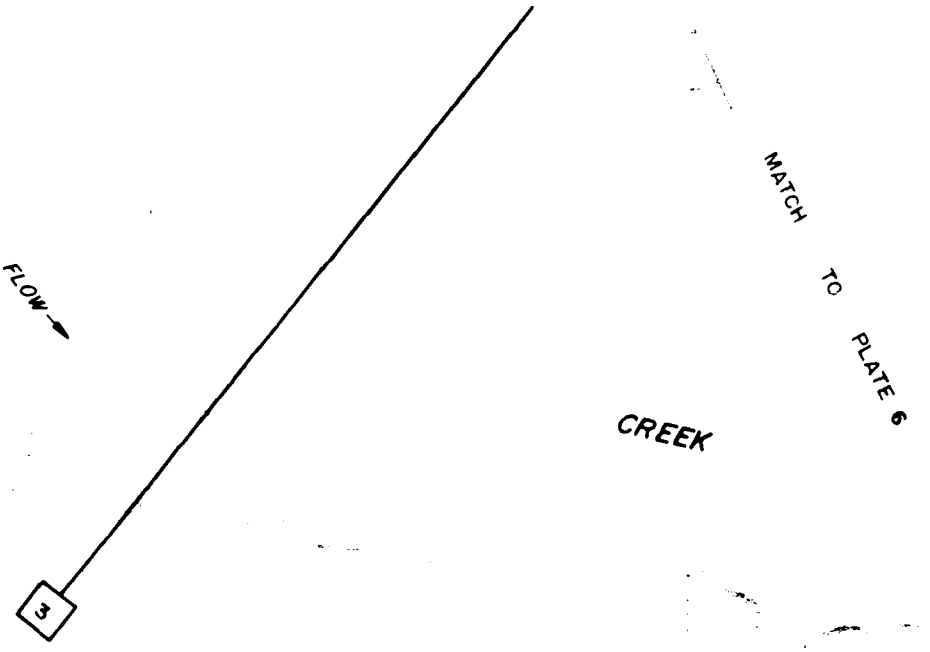
FLOODED AREAS
SHABAKUNK CREEK

PLATE 6

MATCH TO PLATE 8

M+3





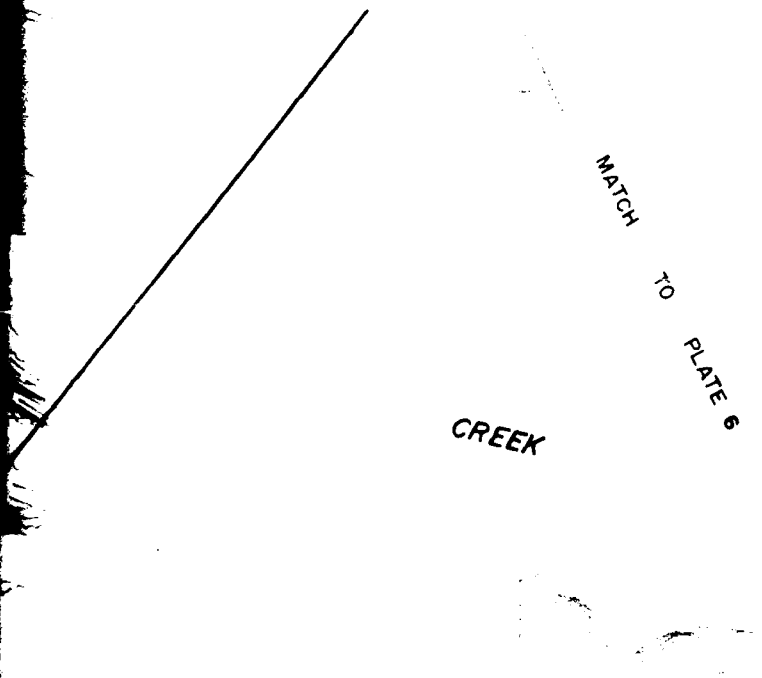
M+3

4

NOTES

1. MAPS BA
MERCER
2. LIMITS
ACTUAL
THE REF
3. AREAS
SUBJECT
4. MINIMU

PHILADELP



LEGEND

OVERFLOW LIMITS

N.J. FLOODWAY DESIGN FLOOD	STANDARD PROJECT FLOOD

M + 3 MILES ABOVE MOUTH

4 CROSS SECTION

GROUND ELEVATION IN FEET SEA LEVEL DATUM

NOTES

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4. MINIMUM COUNTOUR INTERVAL IS 2 FT.

SCALE IN FEET

0 200 400

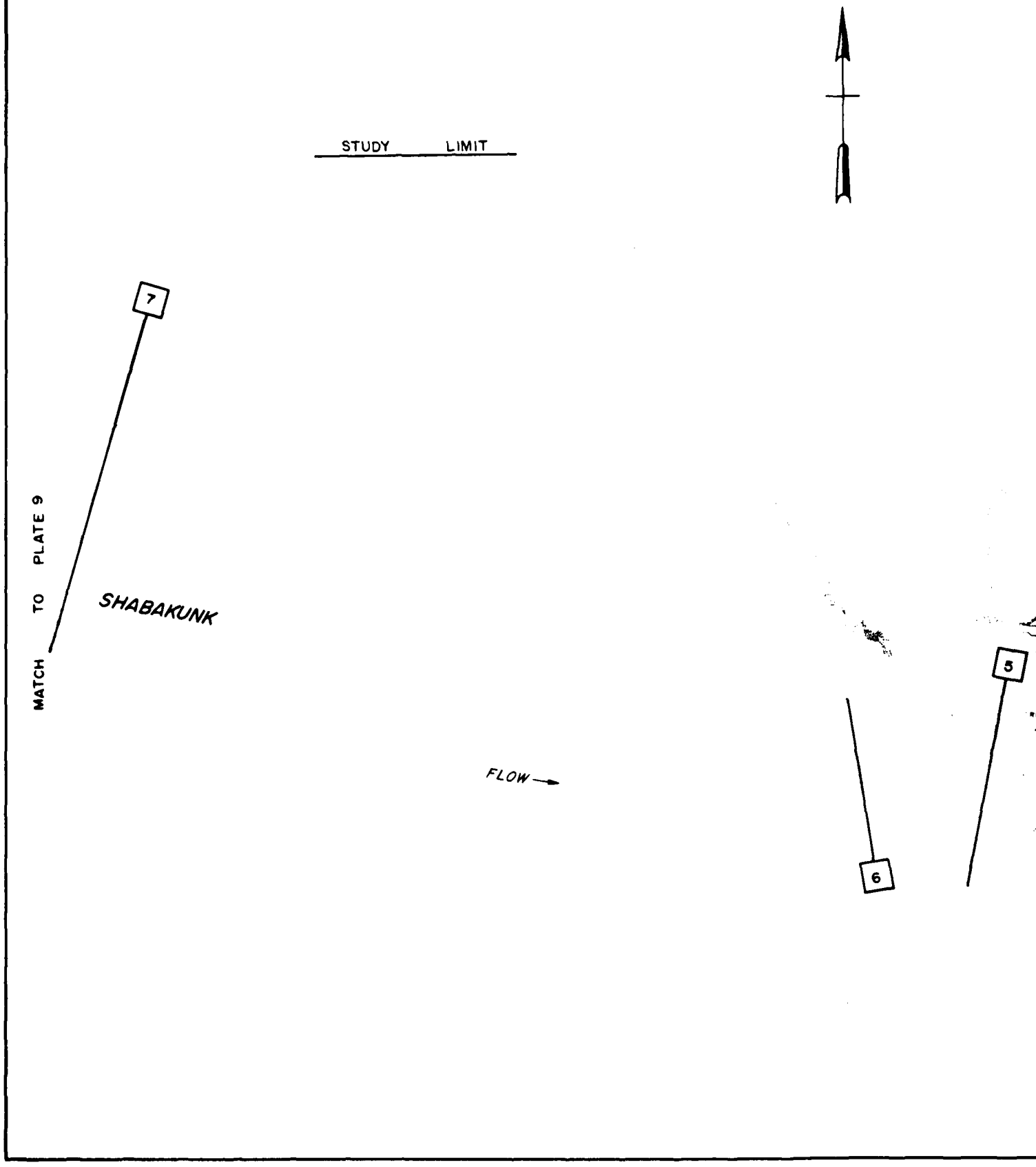
DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

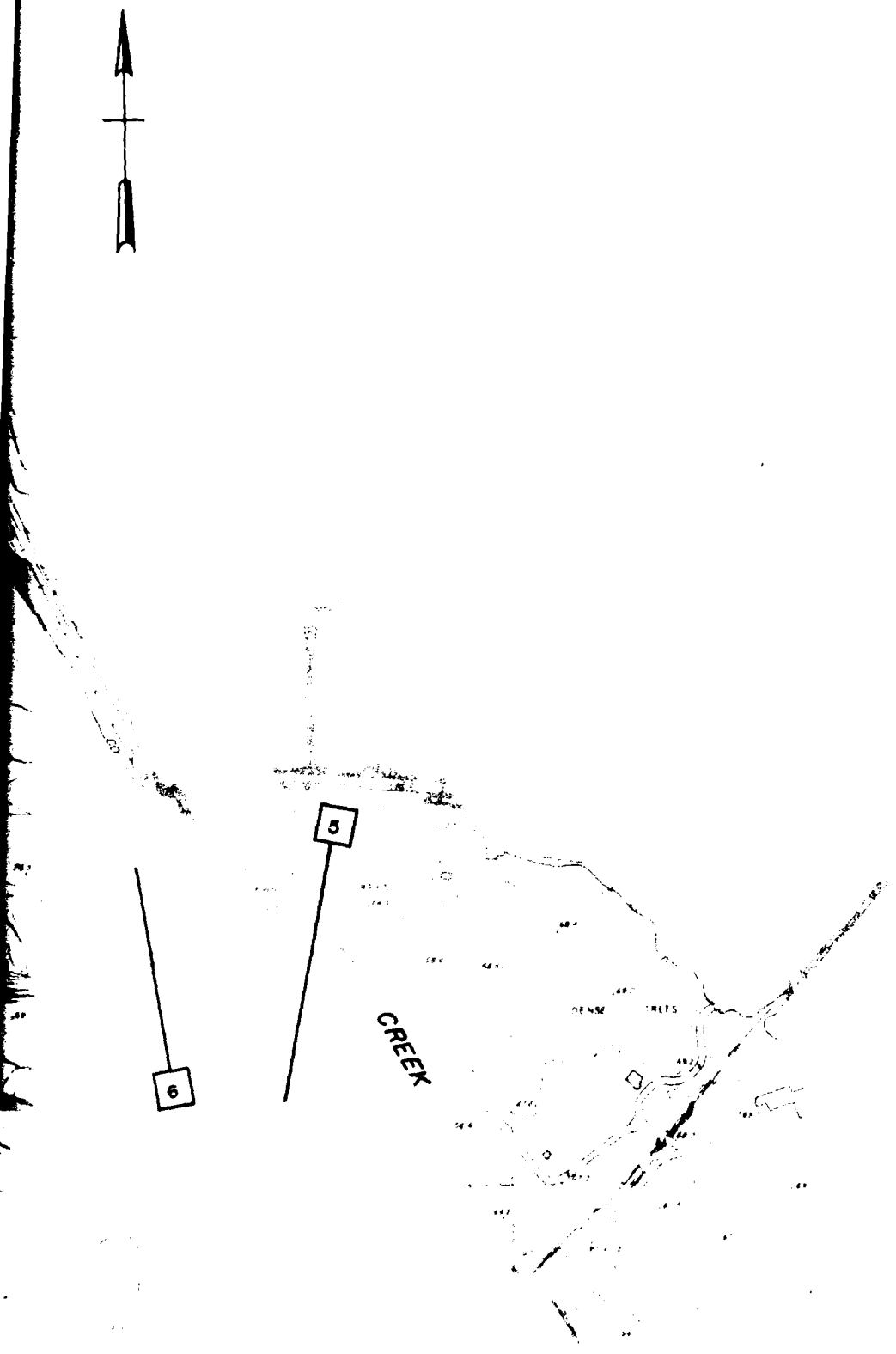
FLOOD PLAIN INFORMATION

SHABAKUNK CREEK
MERCER COUNTY
NEW JERSEY

FLOODED AREAS
SHABAKUNK CREEK

PLATE 7


STUDY LIMIT
7
MATCH TO PLATE 9
SHABAKUNK
FLOW
6
5



MATCH TO PLATE 7

PLATE 7

LEGEND

OVERFLOW LIMITS

N.J. FLOODWAY	STANDARD
DESIGN	PROJECT
FLOOD	FLOOD

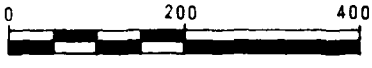
6 — CROSS SECTION

GROUND ELEVATION IN FEET
SEA LEVEL DATUM

NOTES

1. MAPS BASED ON TOPOGRAPHIC MAPS SUPPLIED BY MERCER COUNTY, N.J.
2. LIMITS OF OVERFLOW SHOWN MAY VARY FROM ACTUAL LOCATION ON GROUND AS EXPLAINED IN THE REPORT.
3. AREAS OUTSIDE THE FLOOD PLAIN MAY BE SUBJECT TO FLOODING FROM LOCAL RUNOFF.
4. MINIMUM COUNTOUR INTERVAL IS 2 FT.

SCALE IN FEET



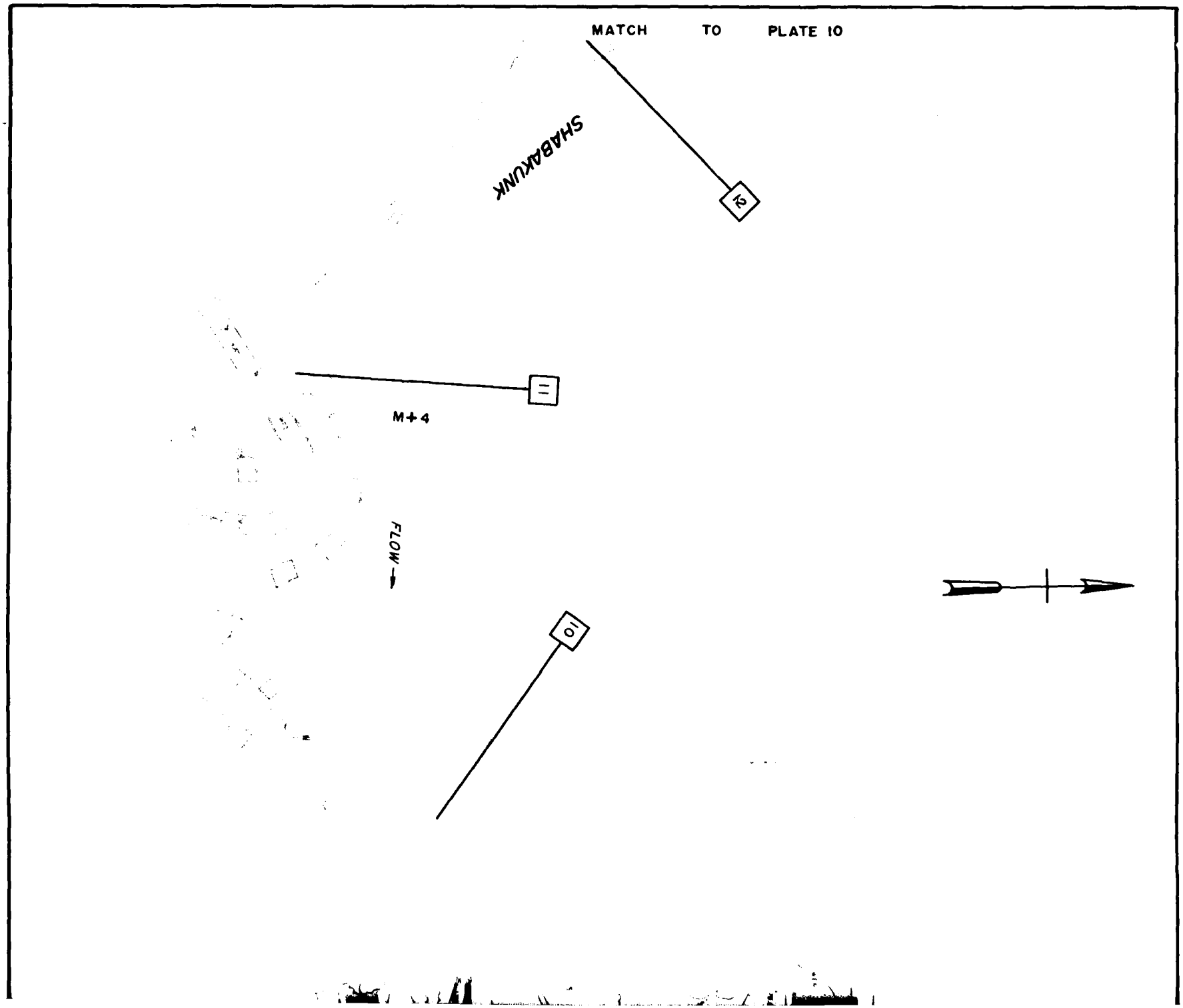
DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

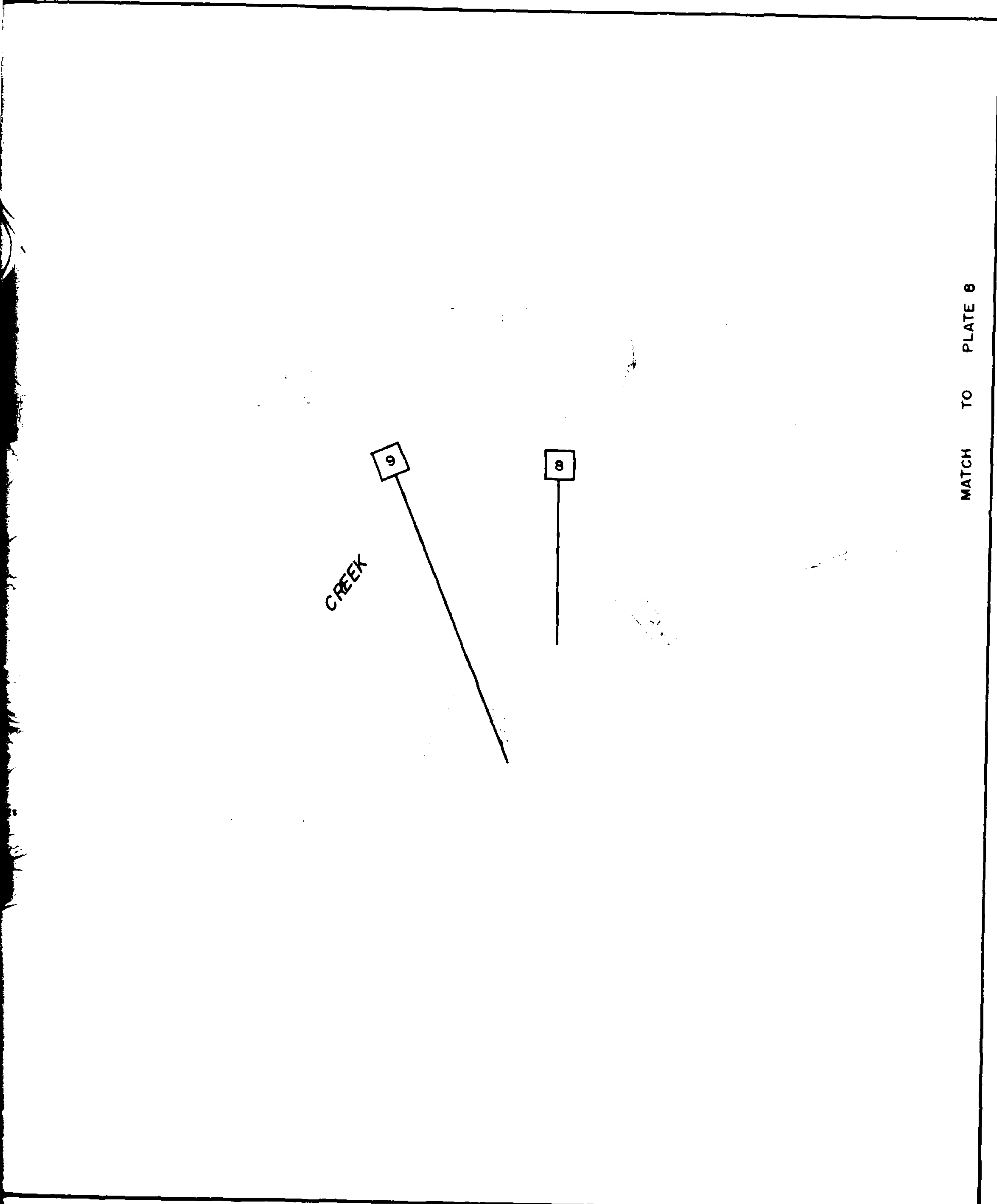
FLOOD PLAIN INFORMATION

SHABAKUNK CREEK
MERCER COUNTY
NEW JERSEY

FLOODED AREAS
SHABAKUNK CREEK

PLATE 8


MATCH TO PLATE 10
SHABAKUNK
M+4
FLOW



M + 4

12

NOTES

1. MAPS B
MERCER

2. LIMITS
ACTUAL
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3. AREAS
SUBJEC

4. MINIMU

PHILADELP

MATCH TO PLATE 8

LEGEND

OVERFLOW LIMITS

N.J. FLOODWAY	STANDARD
DESIGN	PROJECT
FLOOD	FLOOD

M+4 MILES ABOVE MOUTH

12 CROSS SECTION

GROUND ELEVATION IN FEET
SEA LEVEL DATUM

NOTES

1. MAPS BASED ON TOPOGRAPHIC MAPS SUPPLIED BY MERCER COUNTY, N.J.
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SCALE IN FEET
0 200 400

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

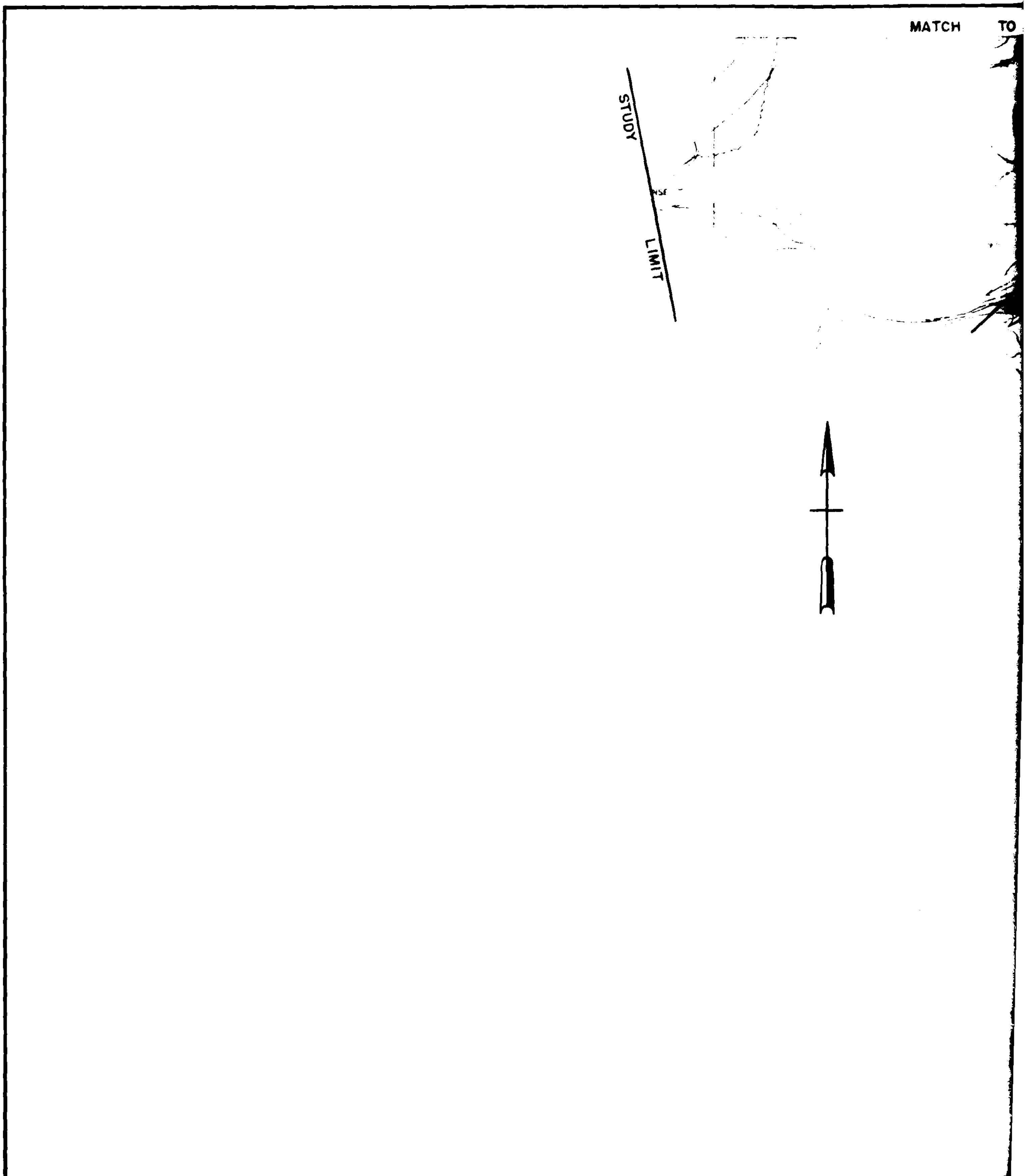
FLOOD PLAIN INFORMATION

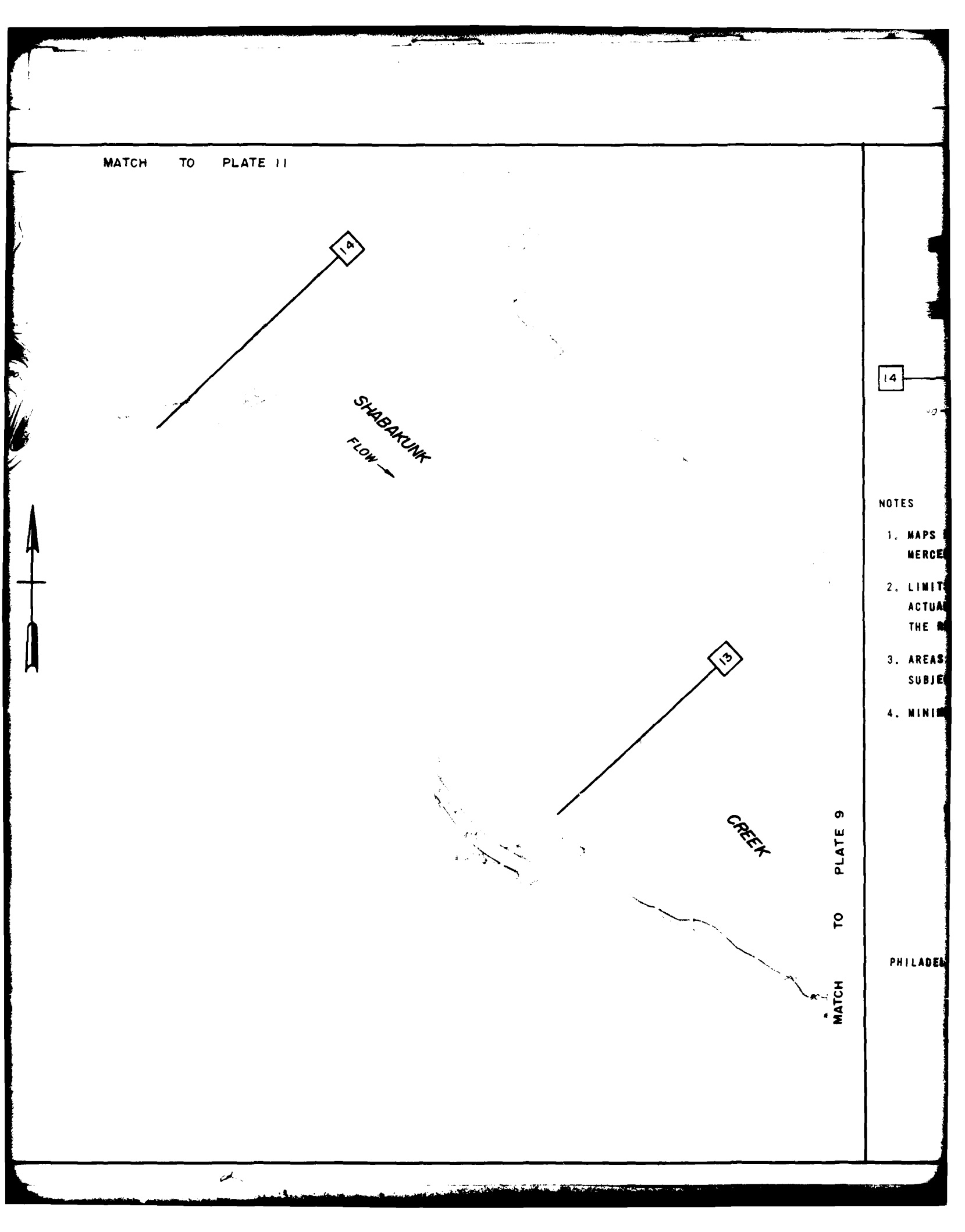
'HABAKUNK CREEK
'RCER COUNTY
.IEW JERSEY

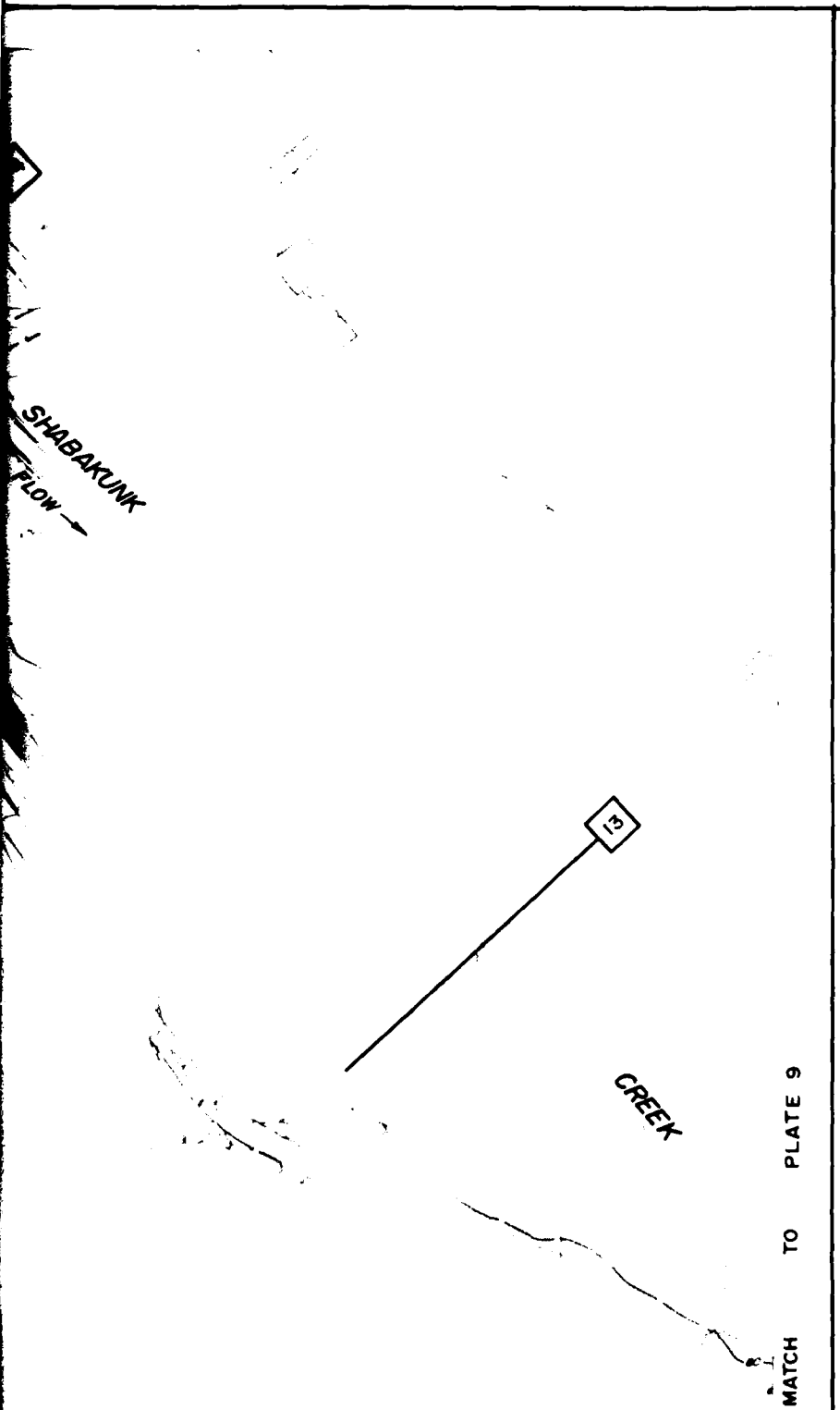
FLOODED AREAS

SHABAKUNK CREEK

PLATE 9


MATCH TO
STUDY
LIMIT


MATCH TO PLATE 11
14
SHABAKUNK
FLOW
13
CREEK
MATCH TO PLATE 9
14
NOTES
1. MAPS
MERCE
2. LIMIT
ACTUA
THE
3. AREAS
SUBJE
4. MINI
PHILADEL



LEGEND

OVERFLOW LIMITS

N.J. FLOODWAY	STANDARD
DESIGN	PROJECT
FLOOD	FLOOD

14 — CROSS SECTION

GROUND ELEVATION IN FEET
SEA LEVEL DATUM

NOTES

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4. MINIMUM COUNTOUR INTERVAL IS 2 FT.

SCALE IN FEET
0 200 400

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

FLOOD PLAIN INFORMATION

SHABAKUNK CREEK
MERCER COUNTY
NEW JERSEY

FLOODED AREAS
SHABAKUNK CREEK

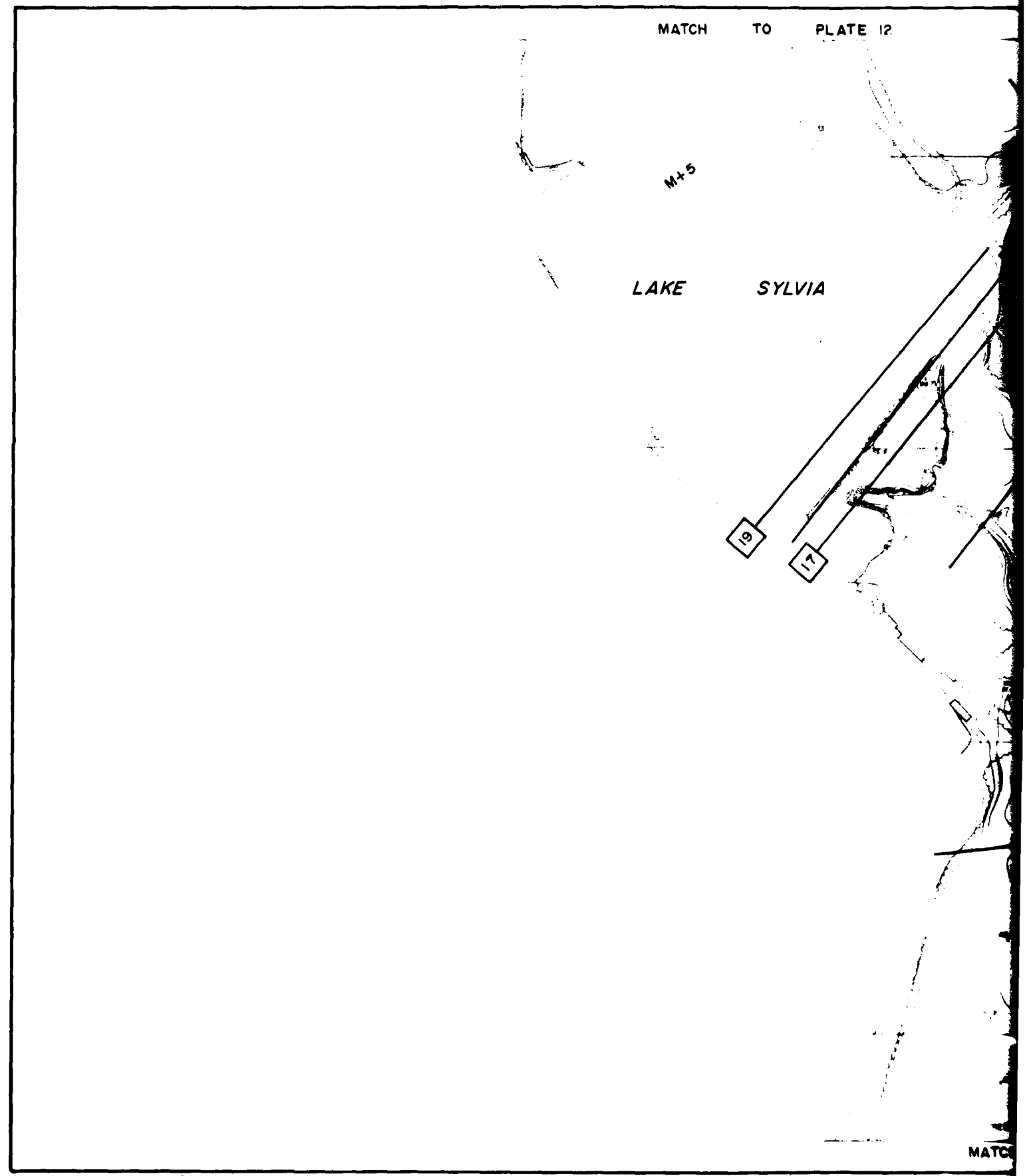
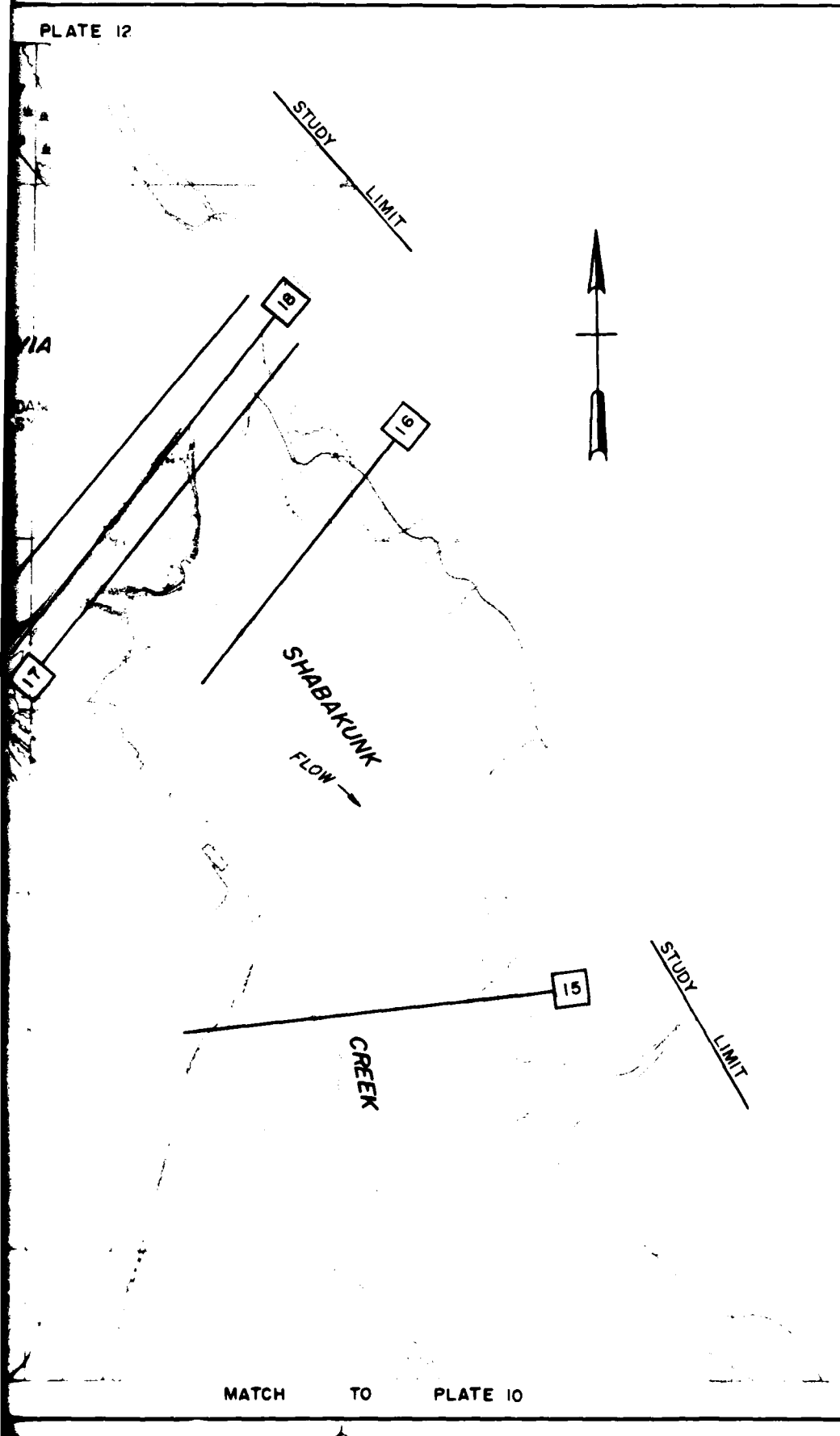

MATCH TO PLATE 12
M+5
LAKE SYLVIA
19
17
MATC

PLATE 12



MATCH TO PLATE 10

M

18

NOTES

1. MAP
NE

2. LIM
ACT
THE

3. ARE
SU

4. MIN

PHILA

15

STUDY LIMIT

10

LEGEND

OVERFLOW LIMITS

N.J. FLOODWAY	STANDARD
DESIGN	PROJECT
FLOOD	FLOOD

M + 5 — MILES ABOVE MOUTH

18 — CROSS SECTION

GROUND ELEVATION IN FEET
SEA LEVEL DATUM

NOTES

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SCALE IN FEET

0 200 400

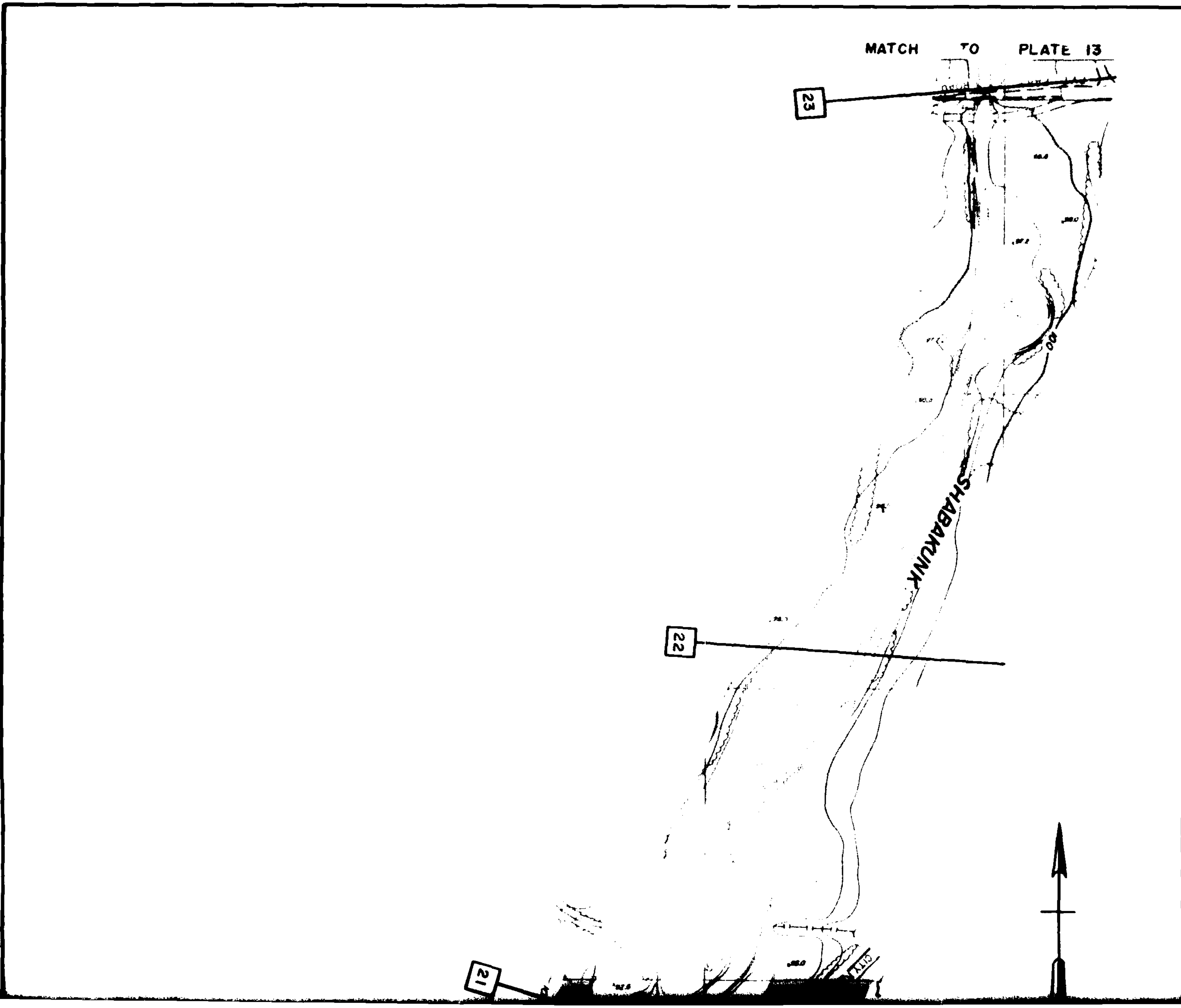
DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

FLOOD PLAIN INFORMATION

SHABAKUNK CREEK
MERCER COUNTY
NEW JERSEY

FLOODED AREAS
SHABAKUNK CREEK

PLATE 11


MATCH TO PLATE 13
23
100
SHABAKUNK
22
CITY
21

MATCH TO PLATE II

STUDY LIMIT

21

NOTES

1. MA
ME

2. LI
AC
TH

3. AR
SU

4. MI

PHIL

MATCH TO PLATE II

STUDY LIMIT

LEGEND

OVERFLOW LIMITS

N.J. FLOODWAY	STANDARD
DESIGN	PROJECT
FLOOD	FLOOD

21 — CROSS SECTION

GROUND ELEVATION IN FEET
SEA LEVEL DATUM

NOTES

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4. MINIMUM COUNTOUR INTERVAL IS 2 FT.

SCALE IN FEET

0 200 400

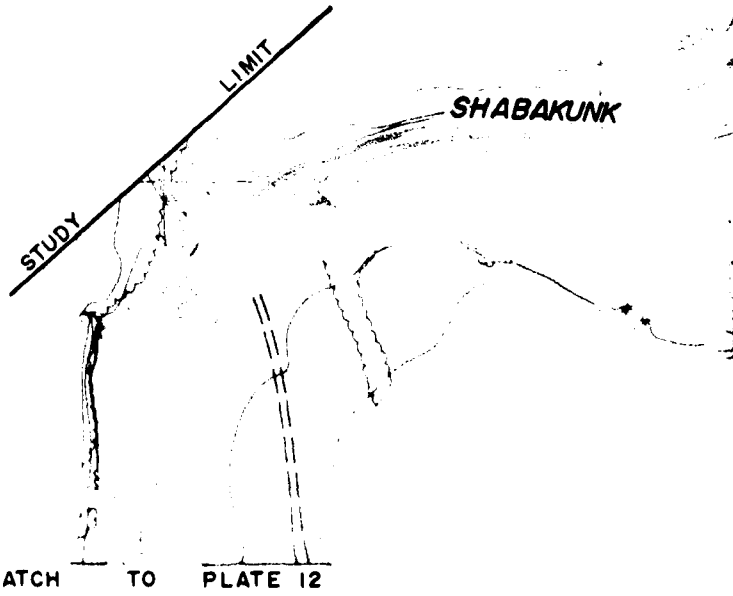
DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

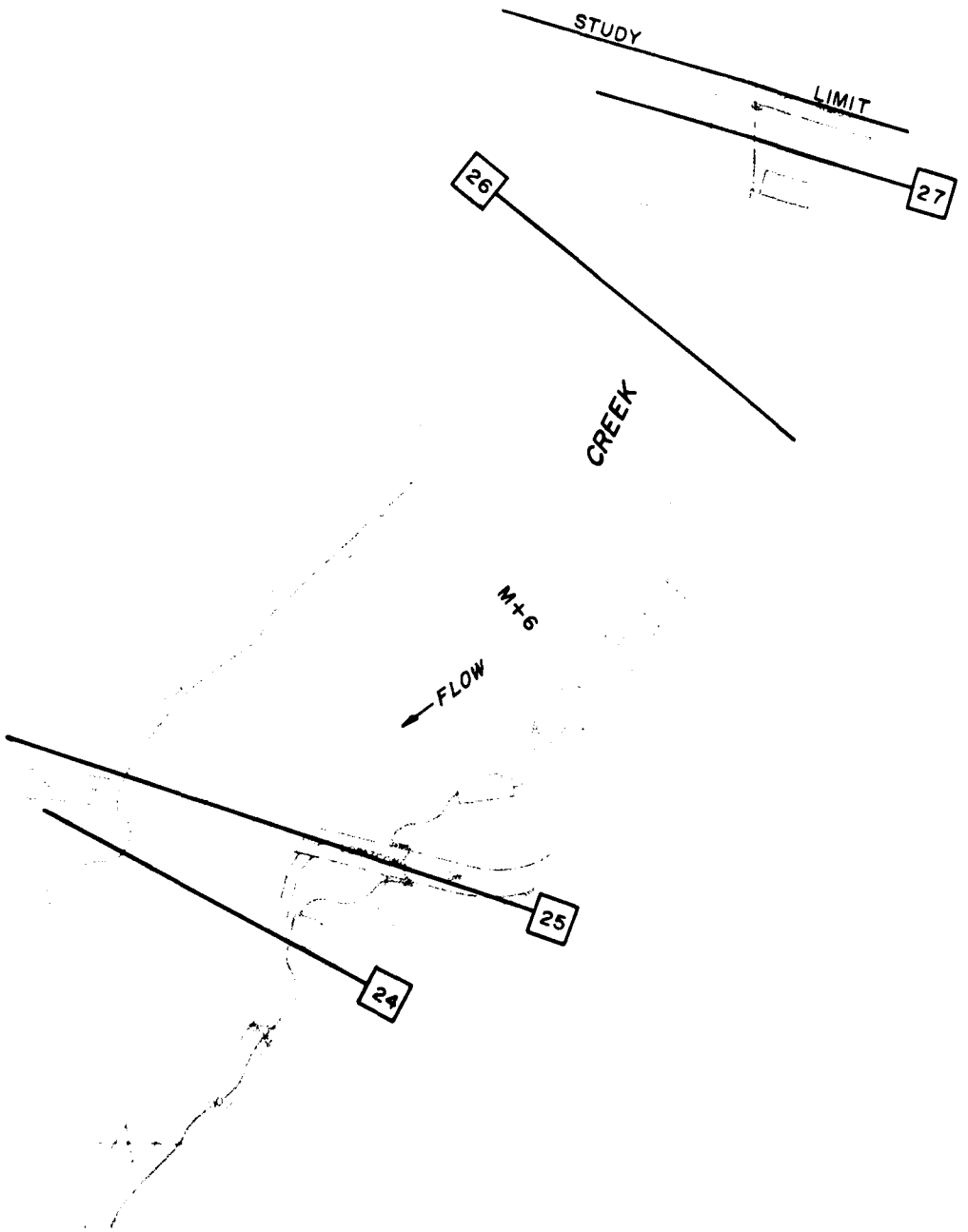
FLOOD PLAIN INFORMATION

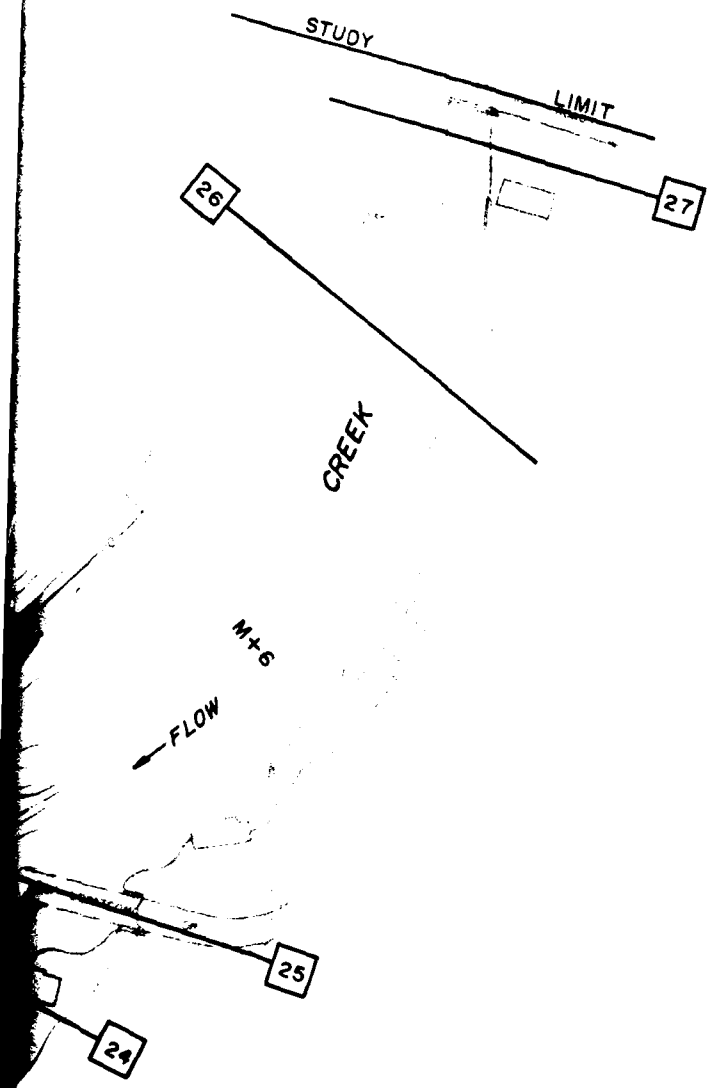
SHABAKUNK CREEK
MERCER COUNTY
NEW JERSEY

FLOODED AREAS
SHABAKUNK CREEK

PLATE 12


STUDY
LIMIT
SHABAKUNK
MATCH TO PLATE 12


STUDY
LIMIT
26
27
CREEK
M+6
FLOW
25
24
SHABAKUNK



LEGEND

OVERFLOW LIMITS

N.J. FLOODWAY	STANDARD
DESIGN	PROJECT
FLOOD	FLOOD

M+6 MILES ABOVE MOUTH

24 CROSS SECTION

GROUND ELEVATION IN FEET
SEA LEVEL DATUM

NOTES

1. MAPS BASED ON TOPOGRAPHIC MAPS SUPPLIED BY MERCER COUNTY, N.J.
2. LIMITS OF OVERFLOW SHOWN MAY VARY FROM ACTUAL LOCATION ON GROUND AS EXPLAINED IN THE REPORT.
3. AREAS OUTSIDE THE FLOOD PLAIN MAY BE SUBJECT TO FLOODING FROM LOCAL RUNOFF.
4. MINIMUM COUNTOUR INTERVAL IS 2 FT.

SCALE IN FEET

0 200 400

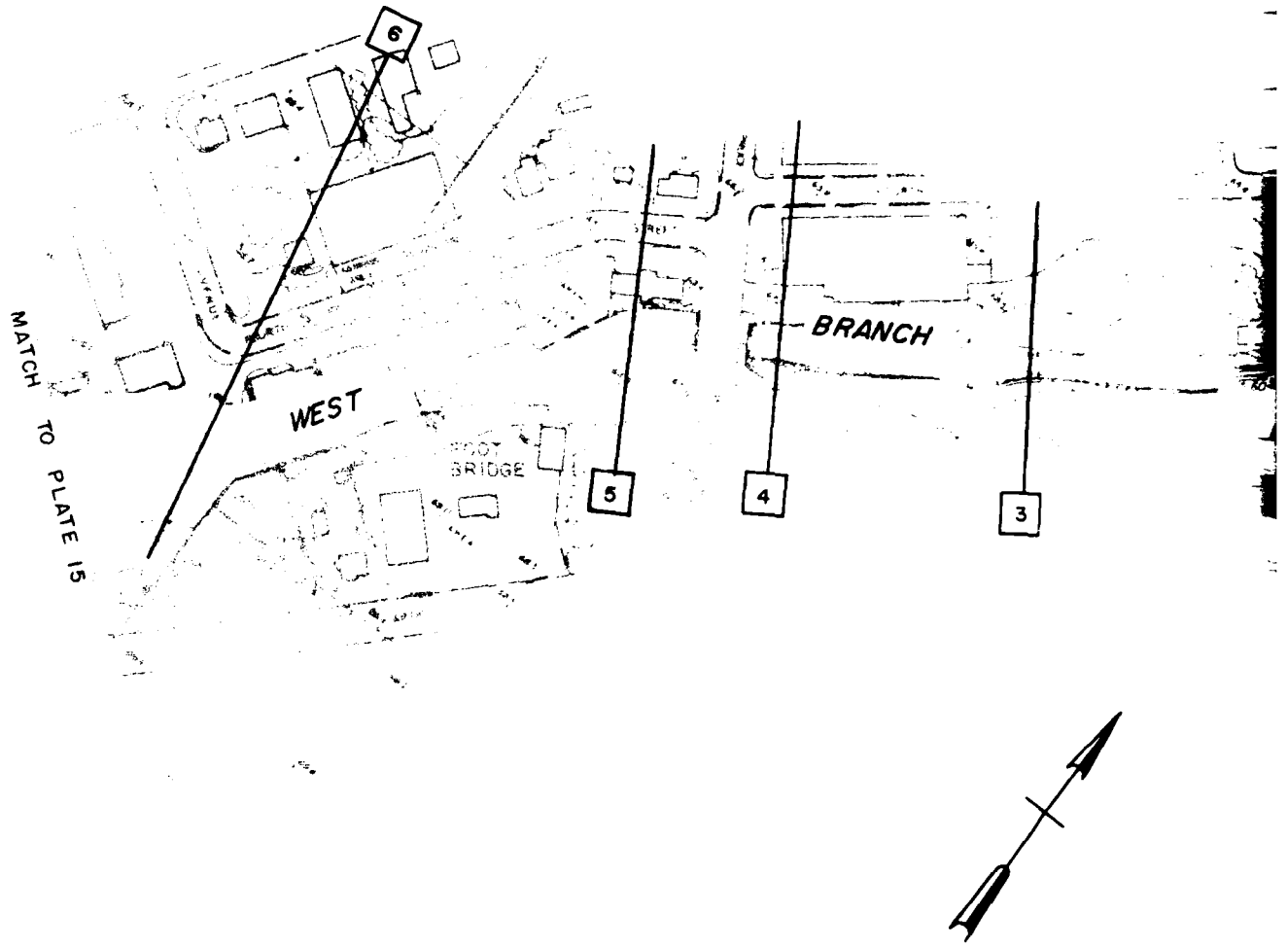
DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

FLOOD PLAIN INFORMATION

SHABAKUNK CREEK
MERCER COUNTY
NEW JERSEY

FLOODED AREAS
SHABAKUNK CREEK

PLATE 18


6
MATCH TO PLATE 15
WEST
BRANCH
5
4
3

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N.J. F
DESI
FLOOD

6 — CROSS

GROUN
SEA LE

NOTES

1. MAPS BASED ON TOPO
MERCER COUNTY, N.J.
2. LIMITS OF OVERFLOW
ACTUAL LOCATION ON
THE REPORT.
3. AREAS OUTSIDE THE
SUBJECT TO FLOODIN
4. MINIMUM COUNTOUR I

SCAL
0

DEPARTMEN
PHILADELPHIA DISTRICT
PHILADELPHI

FLOOD PLA

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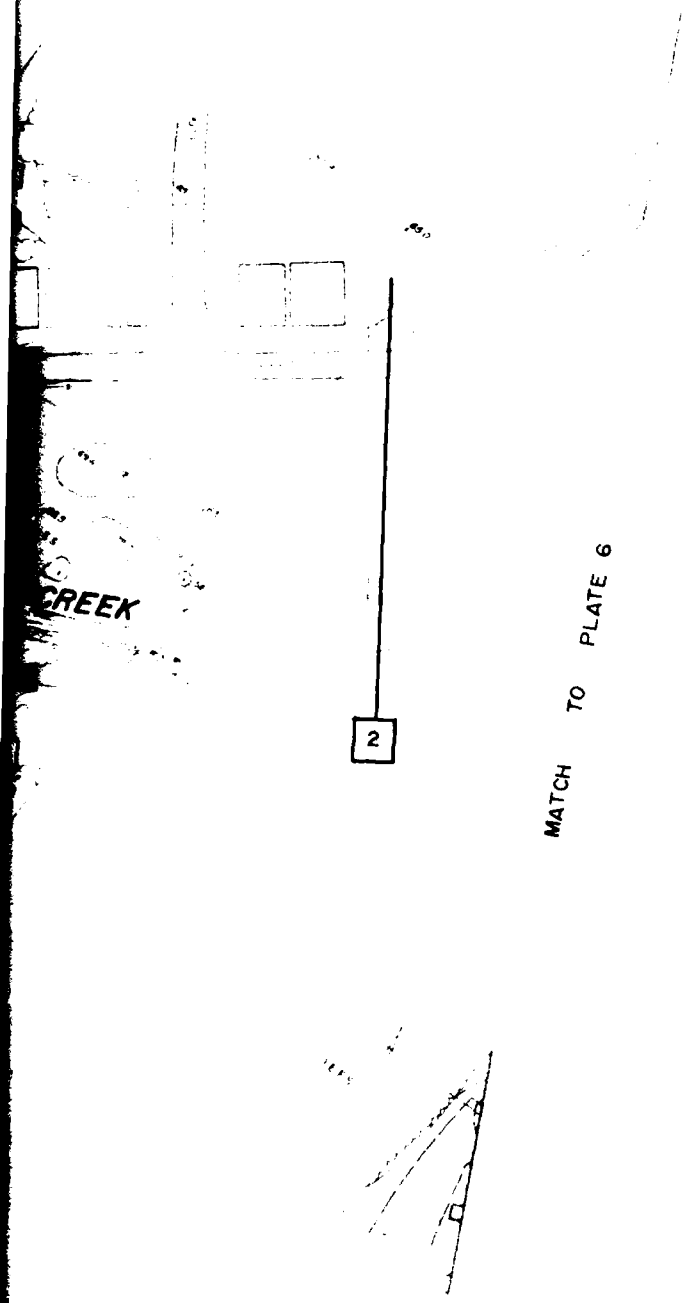
MERCE
NEW

FLOOD

WEST BRANCH



LEGEND

OVERFLOW LIMITS

N.J. FLOODWAY	STANDARD
DESIGN	PROJECT
FLOOD	FLOOD

6 — CROSS SECTION

GROUND ELEVATION IN FEET
SEA LEVEL DATUM

NOTES

1. MAPS BASED ON TOPOGRAPHIC MAPS SUPPLIED BY MERCER COUNTY, N.J
2. LIMITS OF OVERFLOW SHOWN MAY VARY FROM ACTUAL LOCATION ON GROUND AS EXPLAINED IN *THE REPORT*.
3. AREAS OUTSIDE THE FLOOD PLAIN MAY BE SUBJECT TO FLOODING FROM LOCAL RUNOFF.
4. MINIMUM COUNTOUR INTERVAL IS 2 FT.

SCALE IN FEET

0 200 400

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

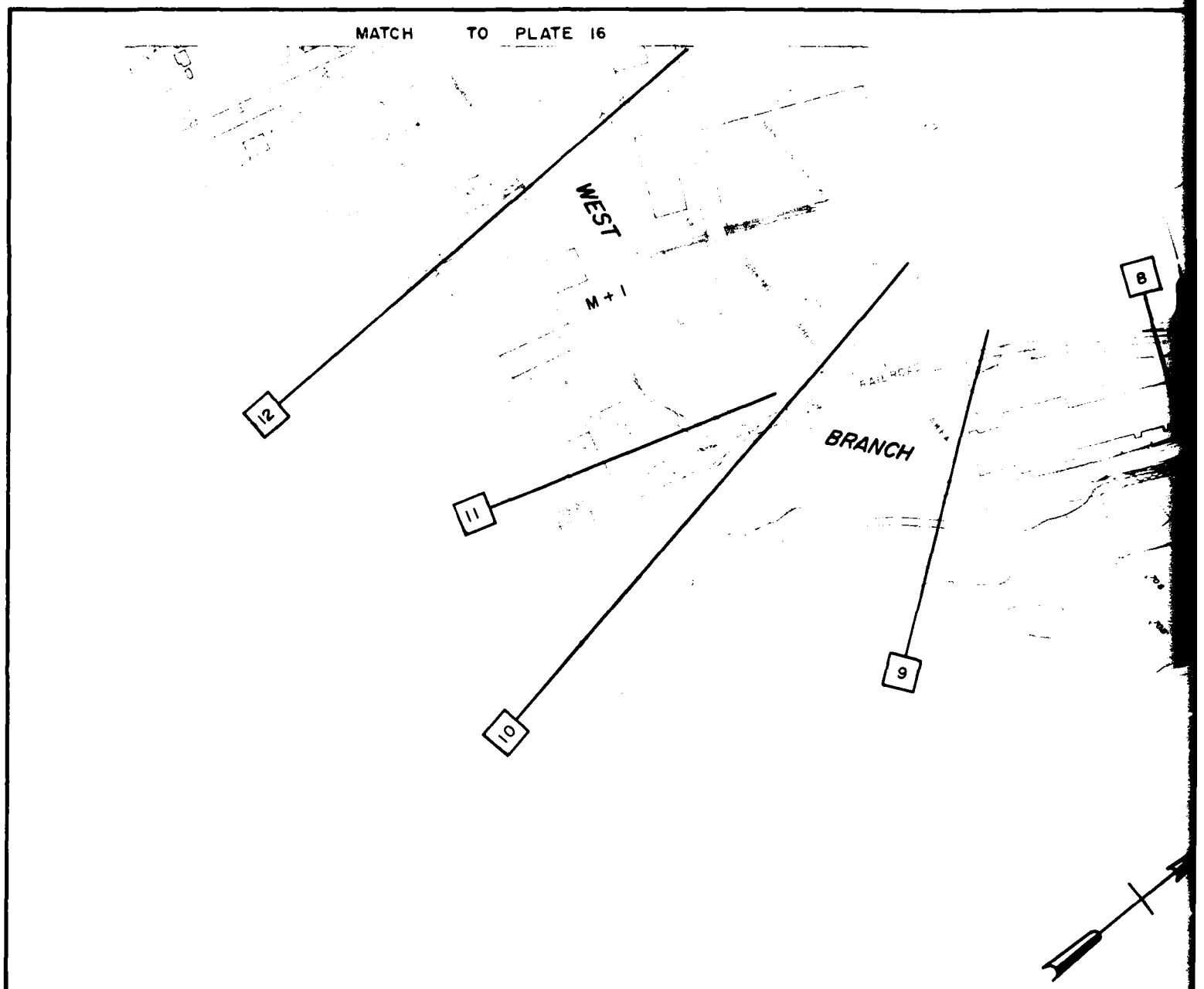
FLOOD PLAIN INFORMATION

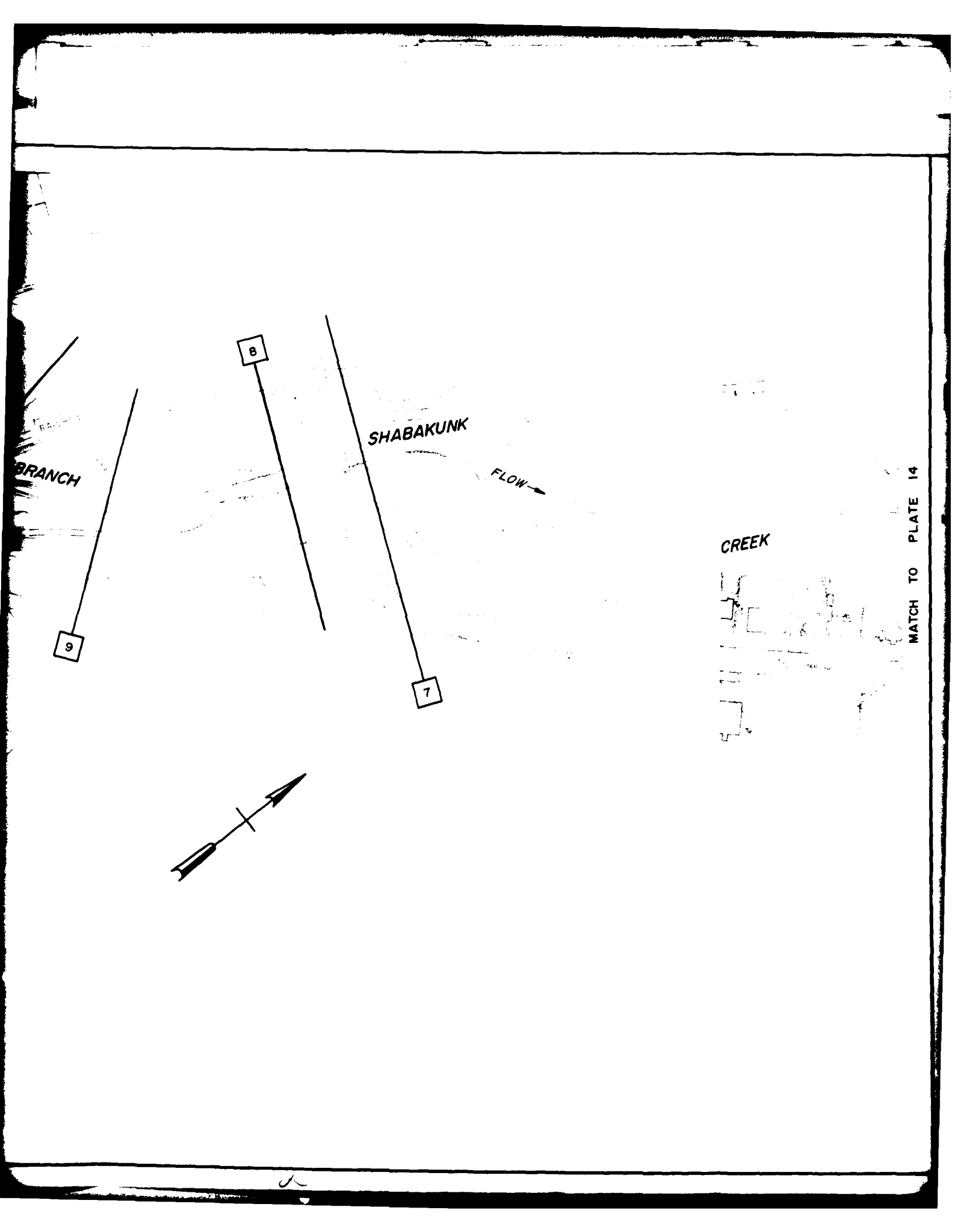
SHABAKUNK CREEK
MERCER COUNTY
NEW JERSEY

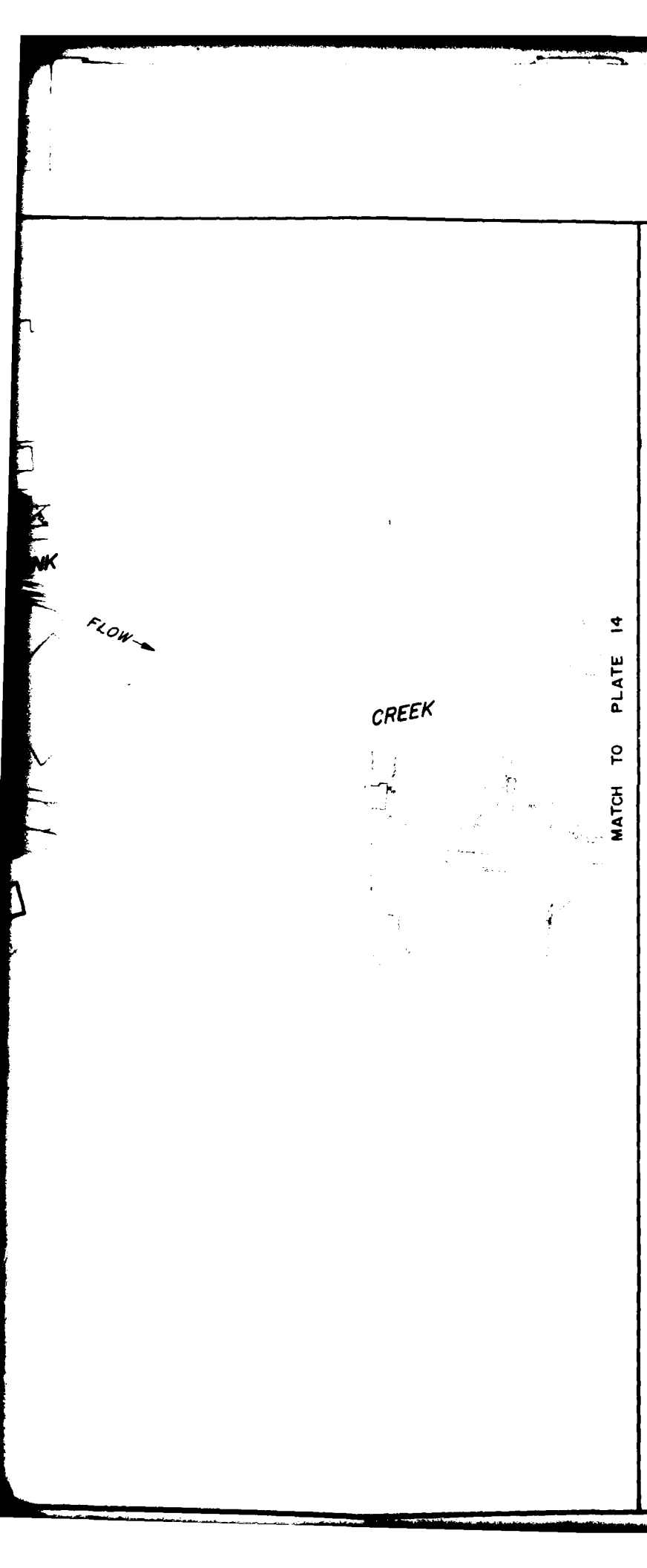
FLOODED AREAS

WEST BRANCH SHABAKUNK CREEK

PLATE 14


MATCH TO PLATE 16
WEST
M+1
BRANCH
8
9
10
11
12


BRANCH
8
SHABAKUNK
FLOW
9
7
CREEK
MATCH TO PLATE 14



LEGEND

OVERFLOW LIMITS

N.J. FLOODWAY	STANDARD
DESIGN	PROJECT
FLOOD	FLOOD

M+I MILES ABOVE MOUTH

8 CROSS SECTION

GROUND ELEVATION IN FEET
SEA LEVEL DATUM

NOTES

1. MAPS BASED ON TOPOGRAPHIC MAPS SUPPLIED BY MERCER COUNTY, N.J.
2. LIMITS OF OVERFLOW SHOWN MAY VARY FROM ACTUAL LOCATION ON GROUND AS EXPLAINED IN THE REPORT.
3. AREAS OUTSIDE THE FLOOD PLAIN MAY BE SUBJECT TO FLOODING FROM LOCAL RUNOFF.
4. MINIMUM COUNTOUR INTERVAL IS 2 FT.

SCALE IN FEET

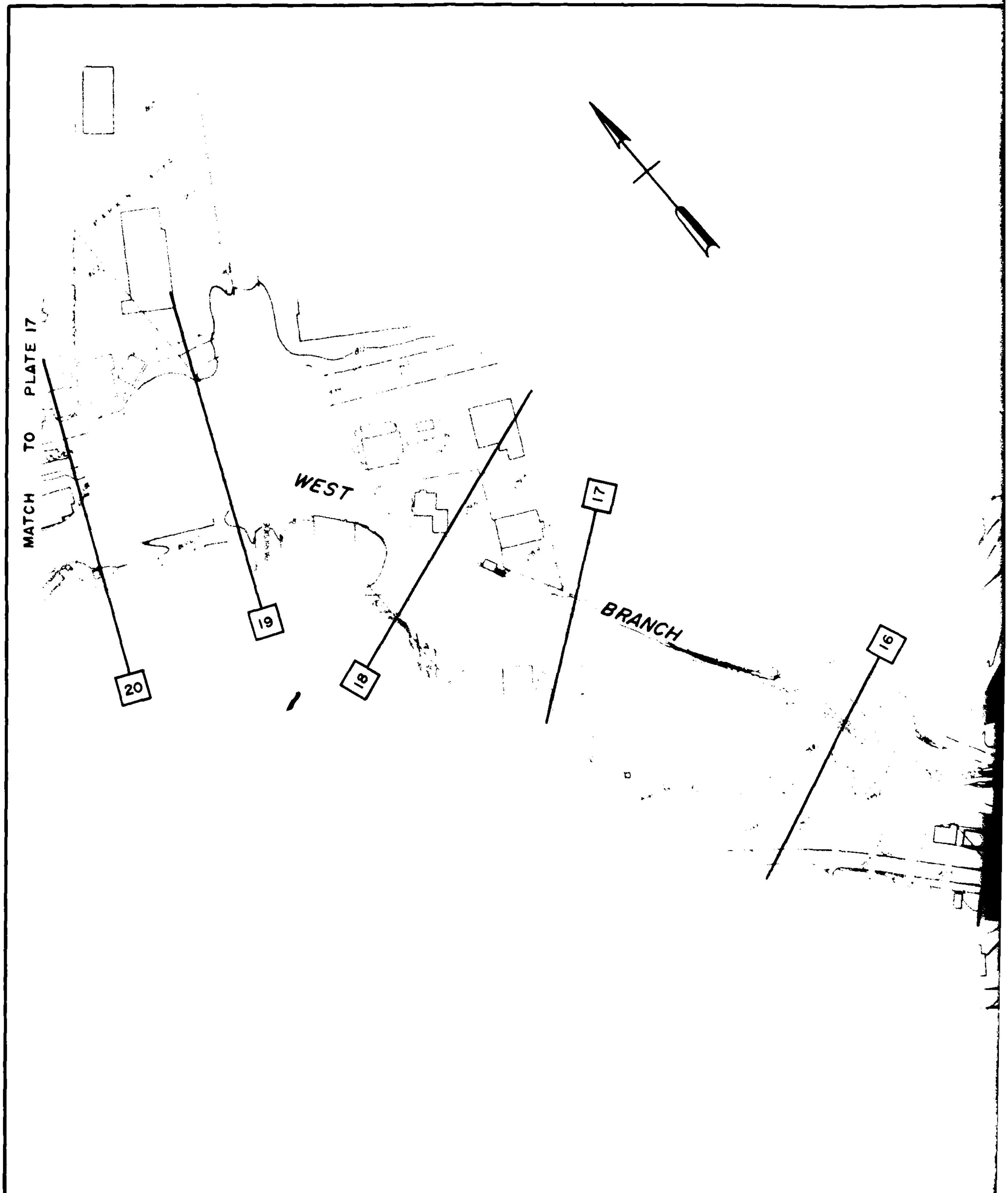
0 200 400

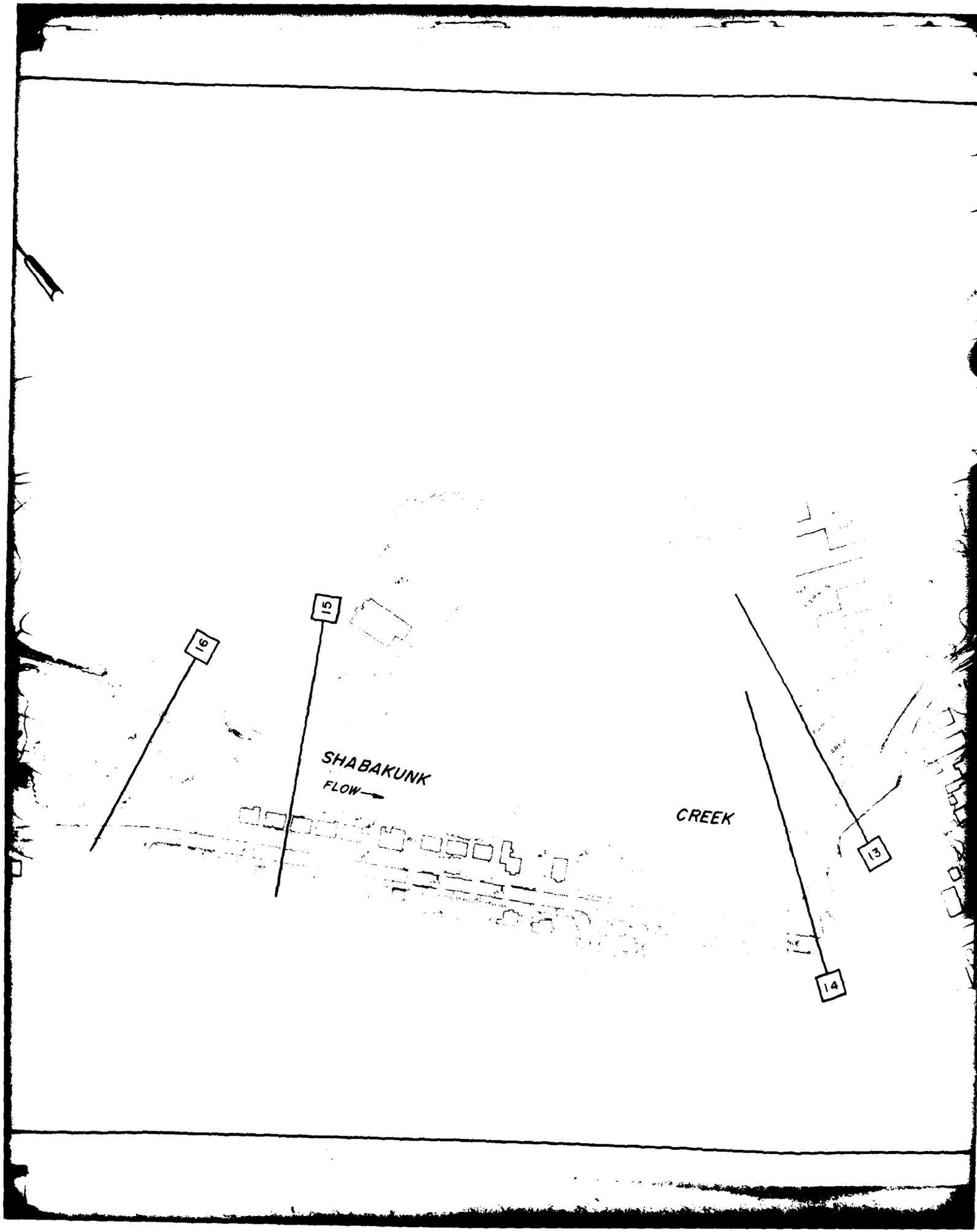
DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

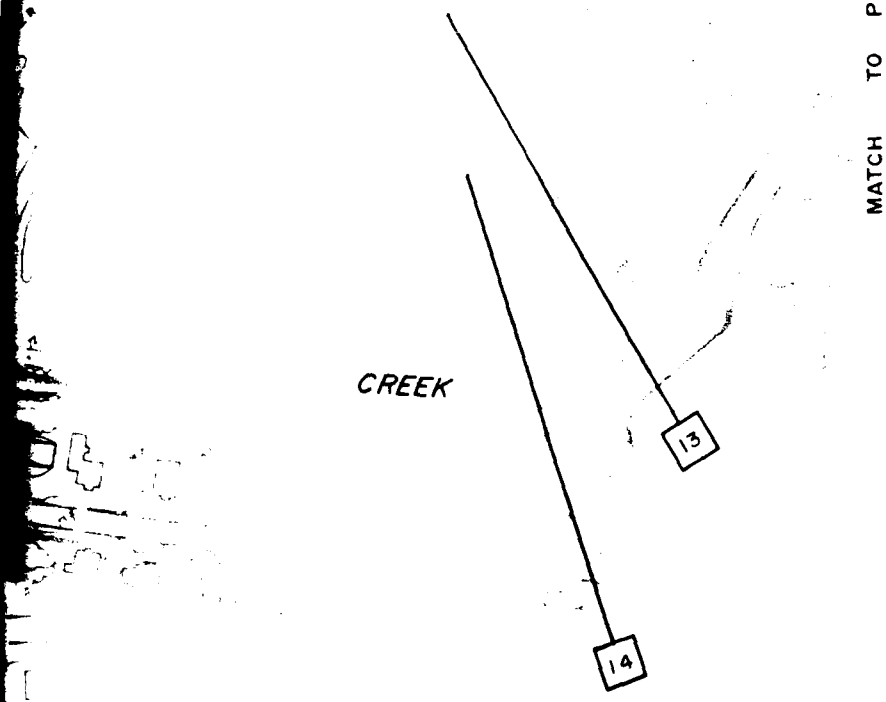
FLOOD PLAIN INFORMATION

SHABAKUNK CREEK
MERCER COUNTY
NEW JERSEY

FLOODED AREAS
WEST BRANCH SHABAKUNK CREEK


MATCH TO PLATE 17
WEST
BRANCH
20
19
18
17
16


16
15
SHABAKUNK
FLOW
CREEK
13
14



MATCH TO PLATE 15

LEGEND

OVERFLOW LIMITS

N.J. FLOODWAY	STANDARD
DESIGN	PROJECT
FLOOD	FLOOD

15 — CROSS SECTION

GROUND ELEVATION IN FEET
SEA LEVEL DATUM

NOTES

1. MAPS BASED ON TOPOGRAPHIC MAPS SUPPLIED BY MERCER COUNTY, N.J.
2. LIMITS OF OVERFLOW SHOWN MAY VARY FROM ACTUAL LOCATION ON GROUND AS EXPLAINED IN THE REPORT.
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4. MINIMUM COUNTOUR INTERVAL IS 2 FT.

SCALE IN FEET
0 200 400

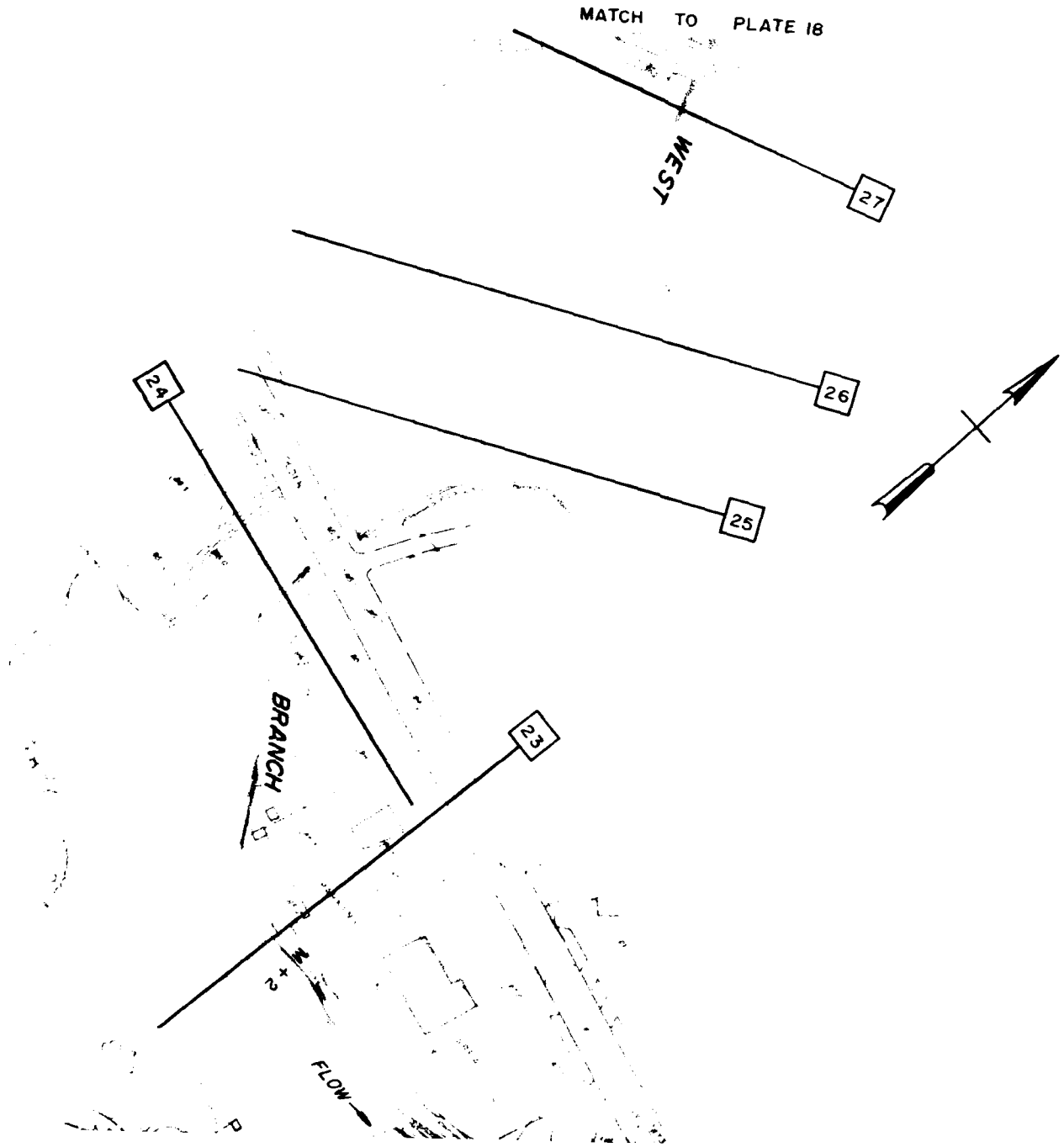
DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

FLOOD PLAIN INFORMATION

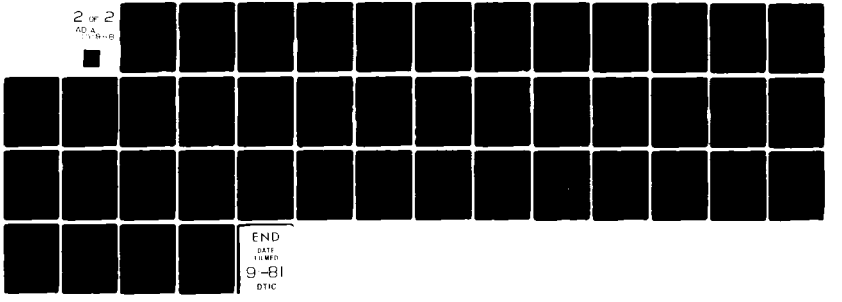
SHABAKUNK CREEK
MERCER COUNTY
NEW JERSEY

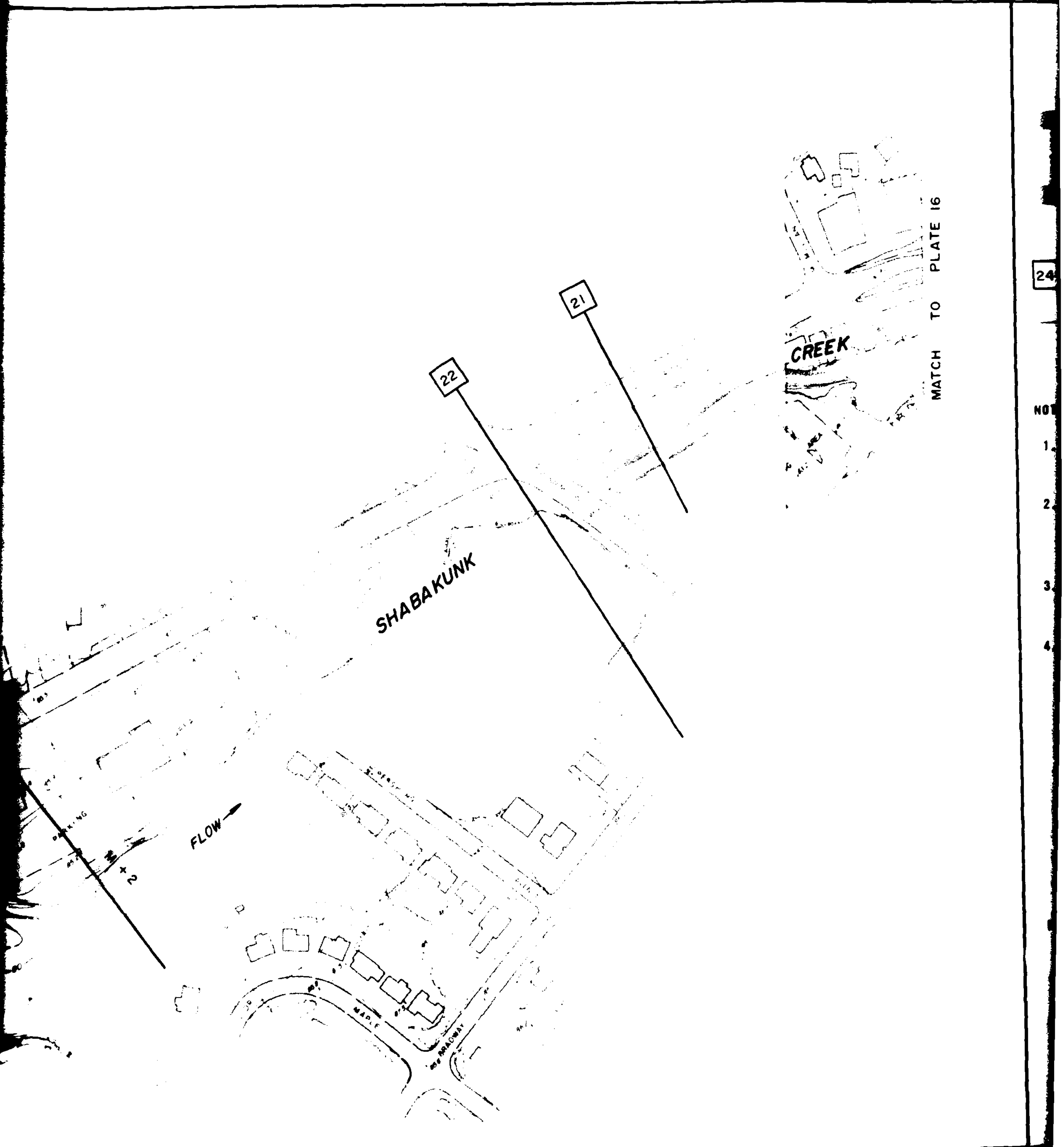
FLOODED AREAS
WEST BRANCH SHABAKUNK CREEK

PLATE 16


MATCH TO PLATE 18
WEST
27
26
25
24
23
BRANCH
2+
FLOW

AD-A101 988 ARMY ENGINEER DISTRICT PHILADELPHIA PA F/G 8/8
FLOOD PLAIN INFORMATION, SHABAKUNK CREEK, WEST BRANCH SHABAKUNK--ETC(U)
OCT 73
UNCLASSIFIED DAEN/NAP-82040/FPI40-73/1 NL





21
22
CREEK
SHABAKUNK
FLOW
MATCH TO PLATE 16
MAPLE
24
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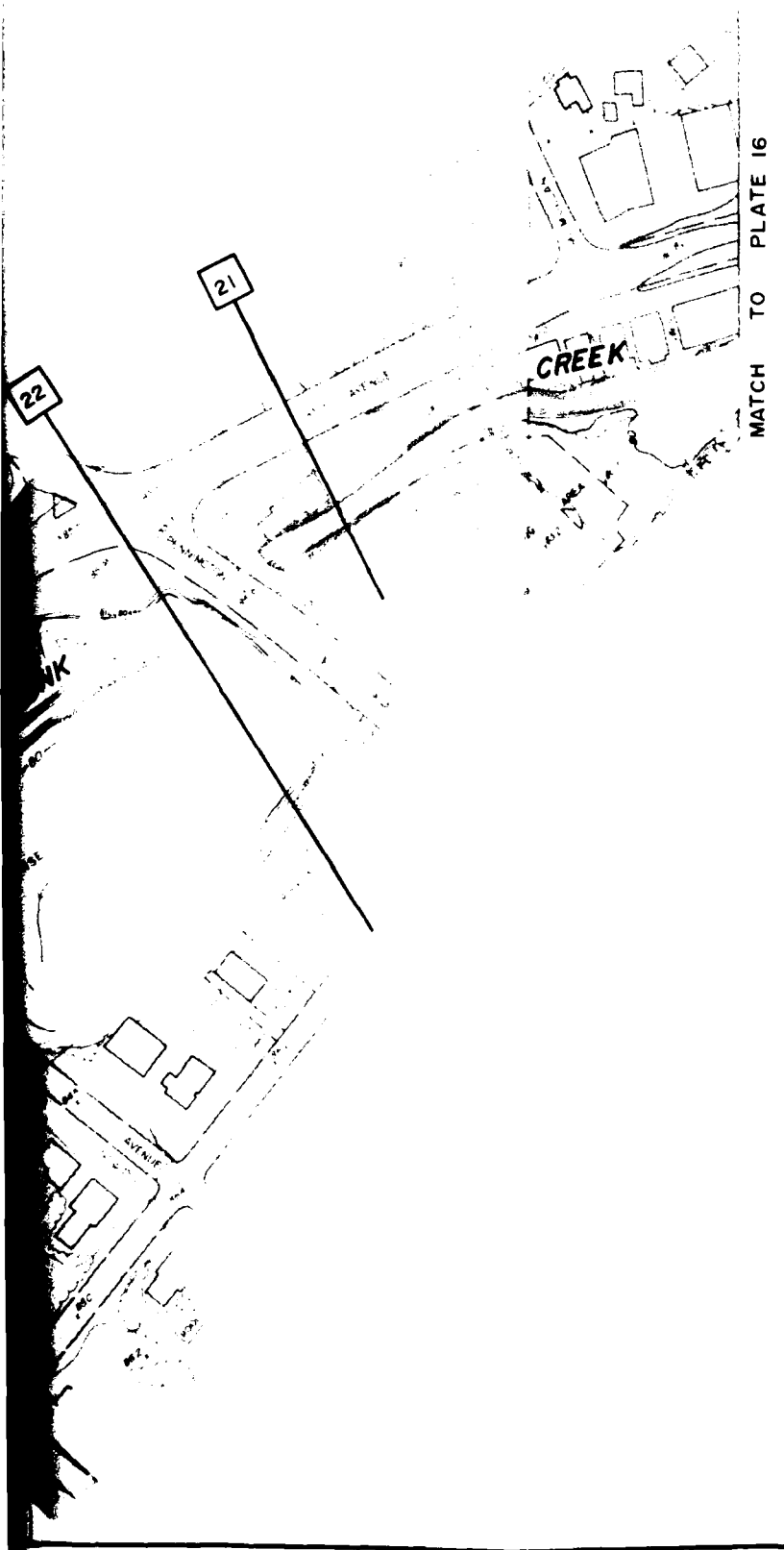
1.
2.
3.
4.



LEGEND

OVERFLOW LIMITS

N.J. FLOODWAY	STANDARD
DESIGN	PROJECT
FLOOD	FLOOD

M+2 MILES ABOVE MOUTH

24 CROSS SECTION

GROUND ELEVATION IN FEET
SEA LEVEL DATUM

NOTES

1. MAPS BASED ON TOPOGRAPHIC MAPS SUPPLIED BY MERCER COUNTY, N.J.
2. LIMITS OF OVERFLOW SHOWN MAY VARY FROM ACTUAL LOCATION ON GROUND AS EXPLAINED IN THE REPORT.
3. AREAS OUTSIDE THE FLOOD PLAIN MAY BE SUBJECT TO FLOODING FROM LOCAL RUNOFF.
4. MINIMUM COUNTOUR INTERVAL IS 2 FT.

SCALE IN FEET

0 200 400

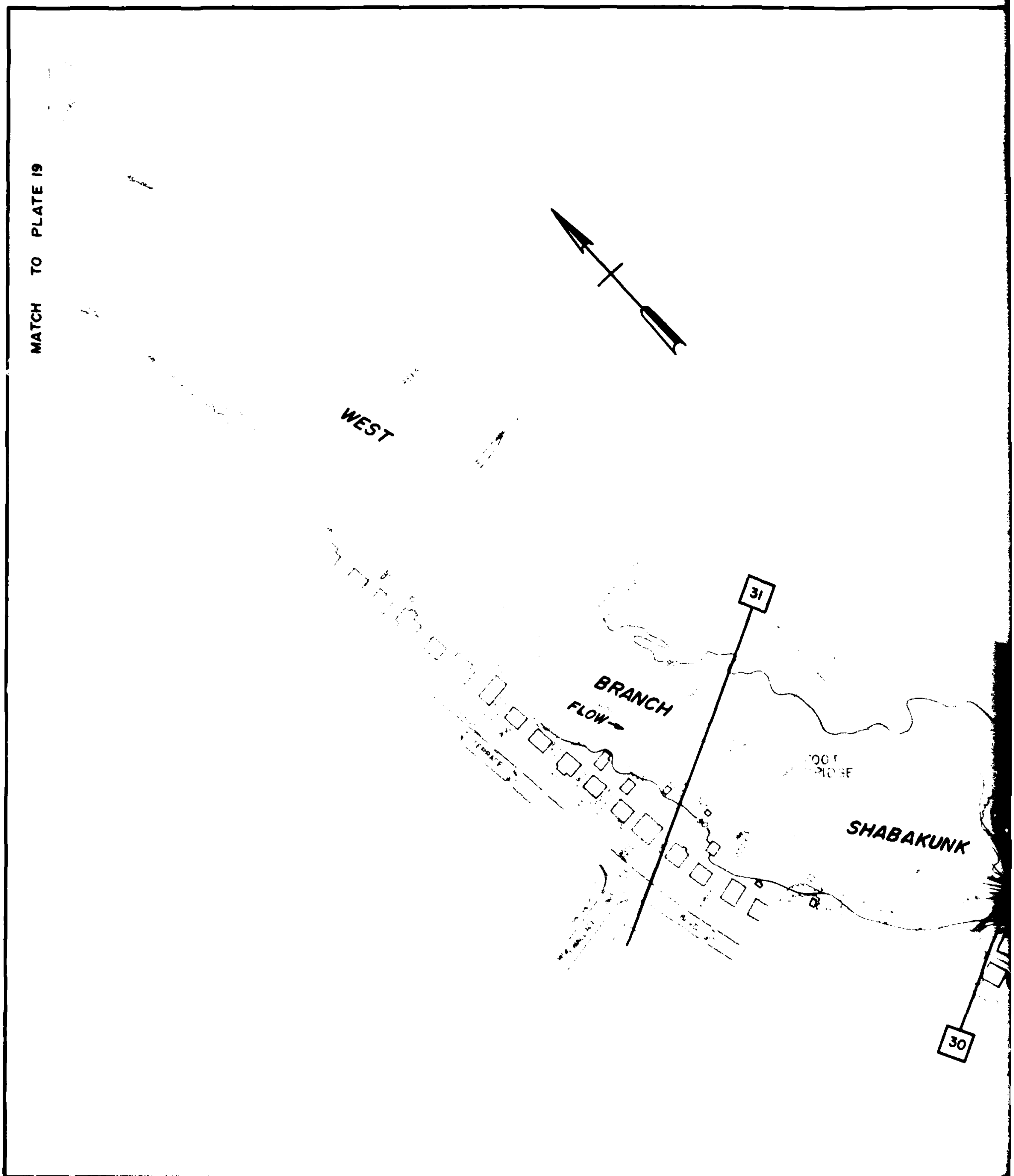
DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

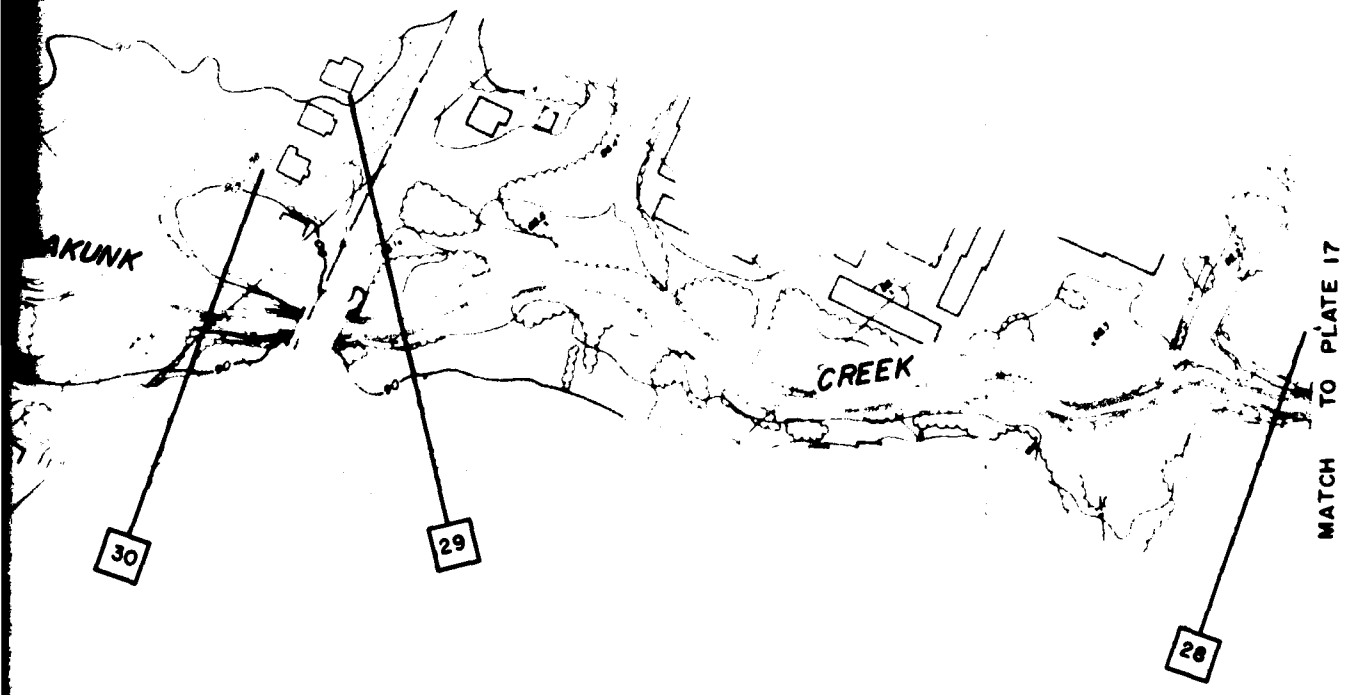
FLOOD PLAIN INFORMATION

SHABAKUNK CREEK
MERCER COUNTY
NEW JERSEY

FLOODED AREAS
WEST BRANCH SHABAKUNK CREEK

PLATE 17


MATCH TO PLATE 19
WEST
BRANCH
FLOW
SHABAKUNK
31
30



30

NOTES

1. MAPS BASED ON
MERCER COUNTY,

2. LIMITS OF OVER
ACTUAL LOCATIO
THE REPORT.

3. AREAS OUTSIDE
SUBJECT TO FLO

4. MINIMUM COUNTO

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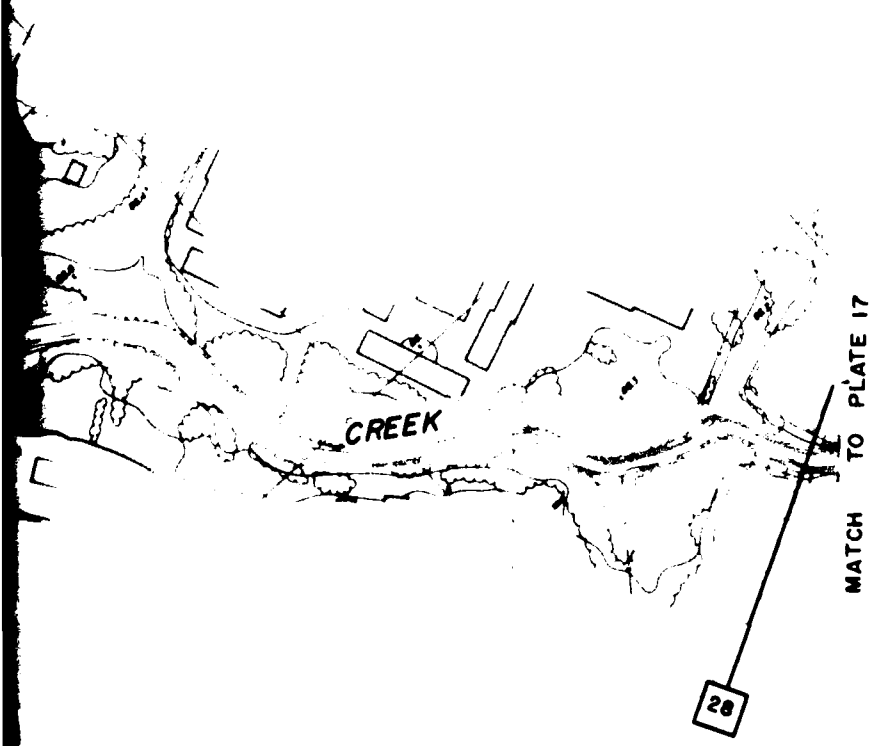

LEGEND

OVERFLOW LIMITS

N.J. FLOODWAY	STANDARD
DESIGN	PROJECT
FLOOD	FLOOD

30 — CROSS SECTION

GROUND ELEVATION IN FEET
SEA LEVEL DATUM

NOTES

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4. MINIMUM COUNTOUR INTERVAL IS 2 FT.

SCALE IN FEET
0 200 400

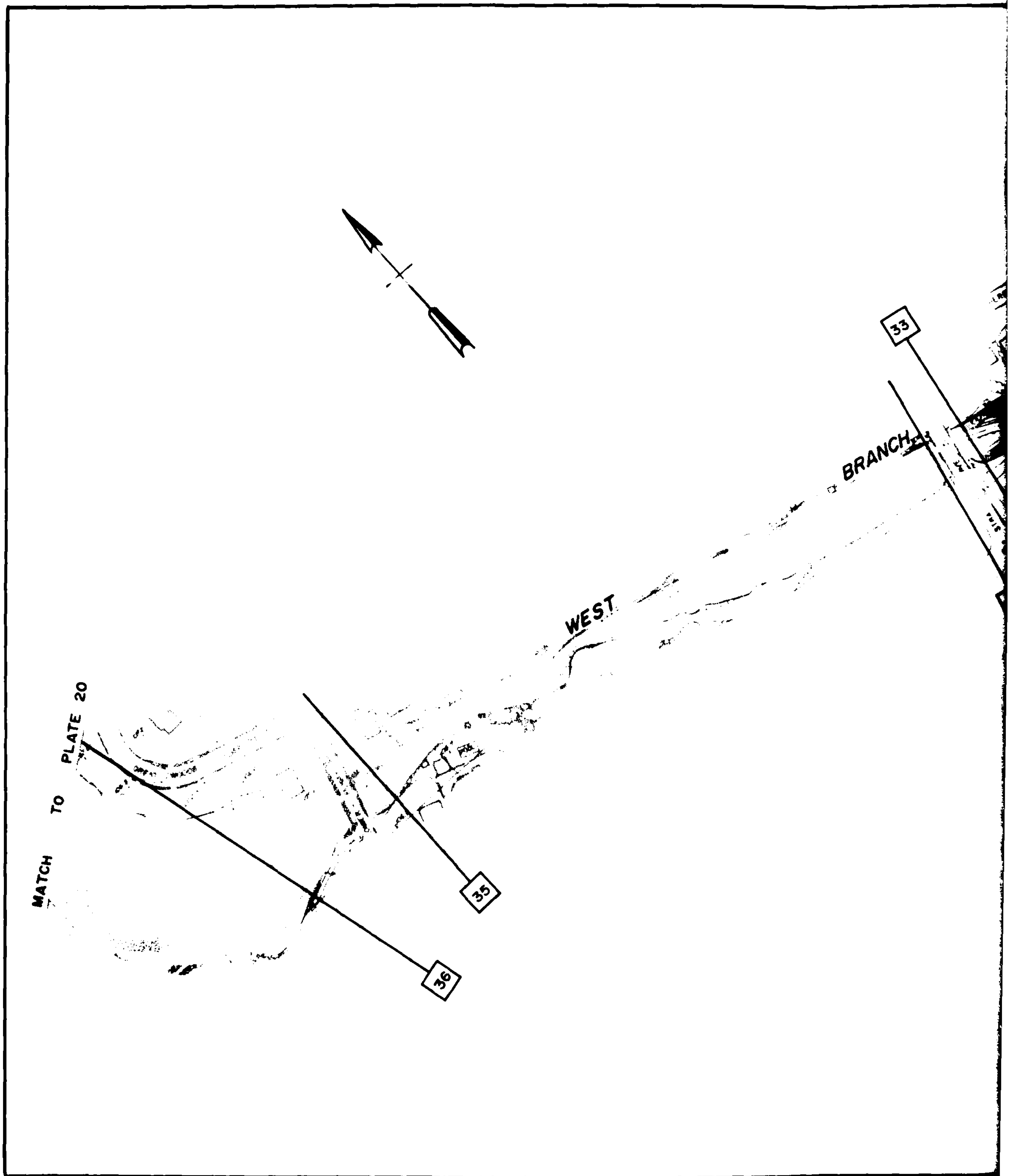
DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

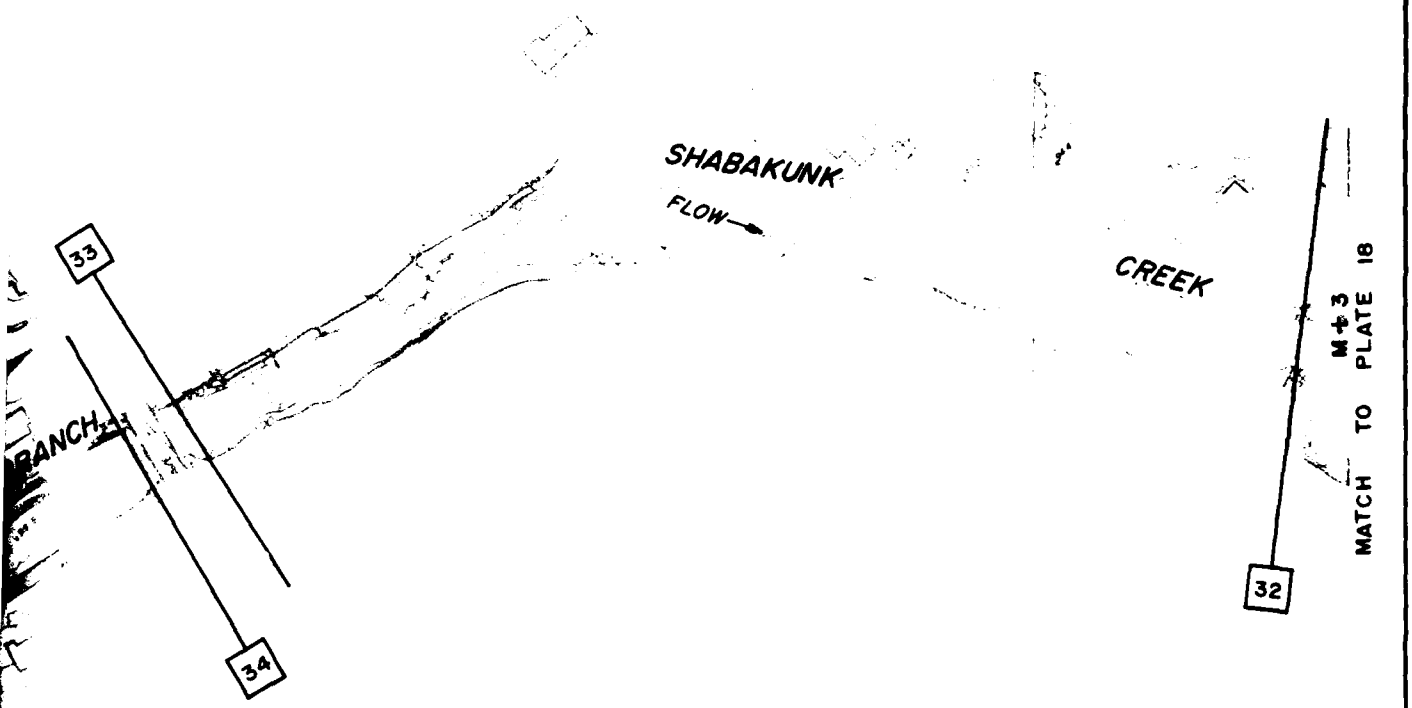
FLOOD PLAIN INFORMATION

SHABAKUNK CREEK
MERCER COUNTY
NEW JERSEY

FLOODED AREAS

WEST BRANCH SHABAKUNK CREEK


MATCH TO PLATE 20
WEST
BRANCH
33
35
36



M + 3

33

NOTES

1. MAPS BASED
MERCER COU

2. LIMITS OF
ACTUAL LOC
THE REPORT.

3. AREAS OUTS
SUBJECT TO

4. MINIMUM C

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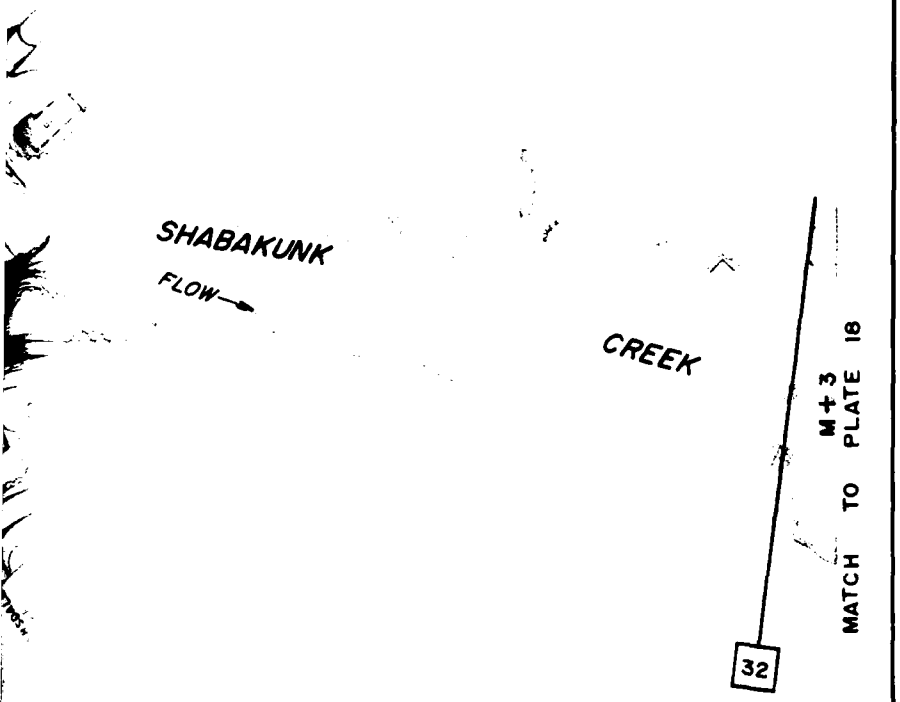
WEST



LEGEND

OVERFLOW LIMITS

N.J. FLOODWAY	STANDARD PROJECT FLOOD
DESIGN FLOOD	

M + 3 MILES ABOVE MOUTH

33 CROSS SECTION

GROUND ELEVATION IN FEET SEA LEVEL DATUM

NOTES

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2. LIMITS OF OVERFLOW SHOWN MAY VARY FROM ACTUAL LOCATION ON GROUND AS EXPLAINED IN THE REPORT.
3. AREAS OUTSIDE THE FLOOD PLAIN MAY BE SUBJECT TO FLOODING FROM LOCAL RUNOFF.
4. MINIMUM COUNTOUR INTERVAL IS 2 FT.

SCALE IN FEET

0 200 400

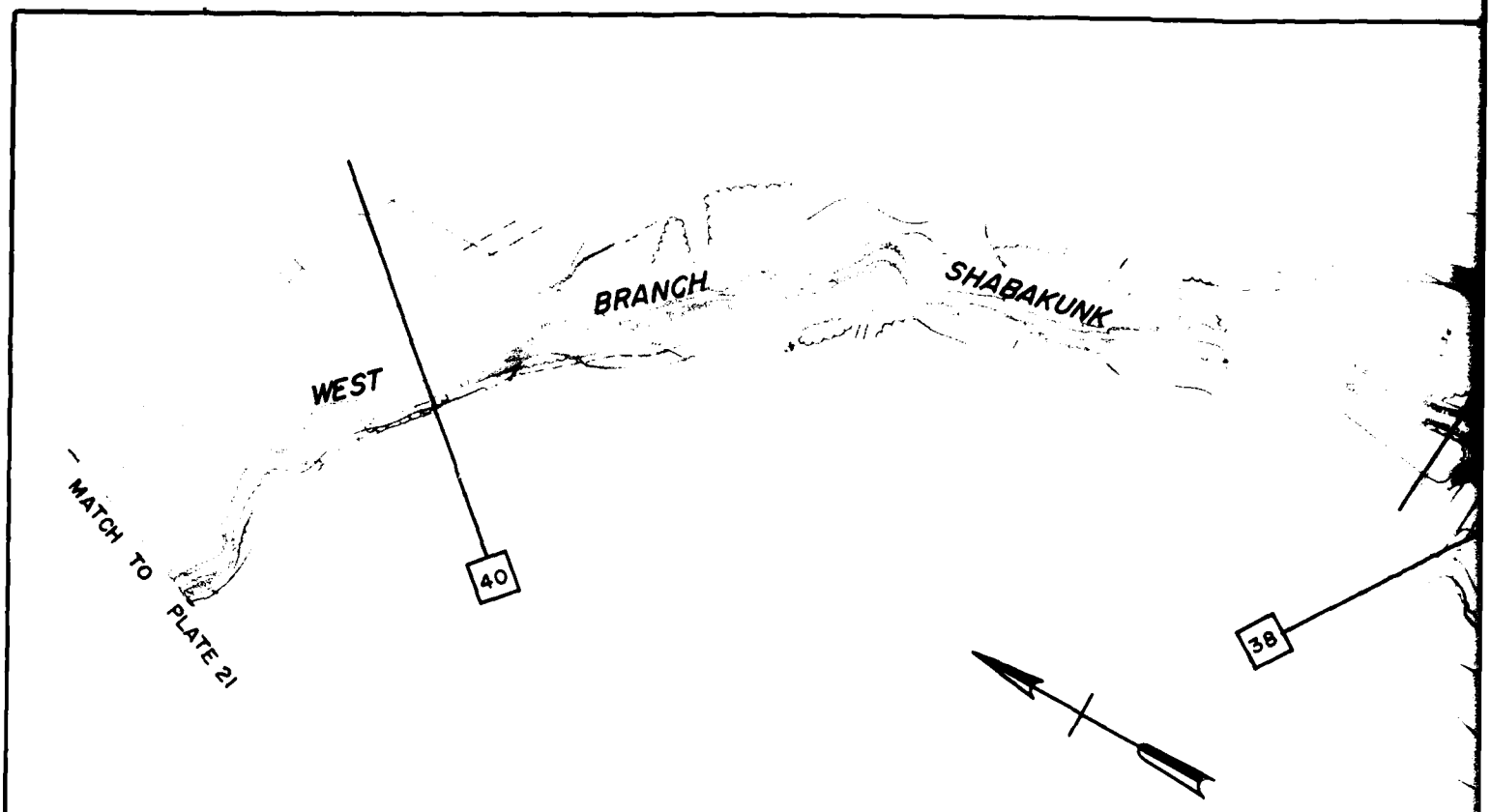
DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

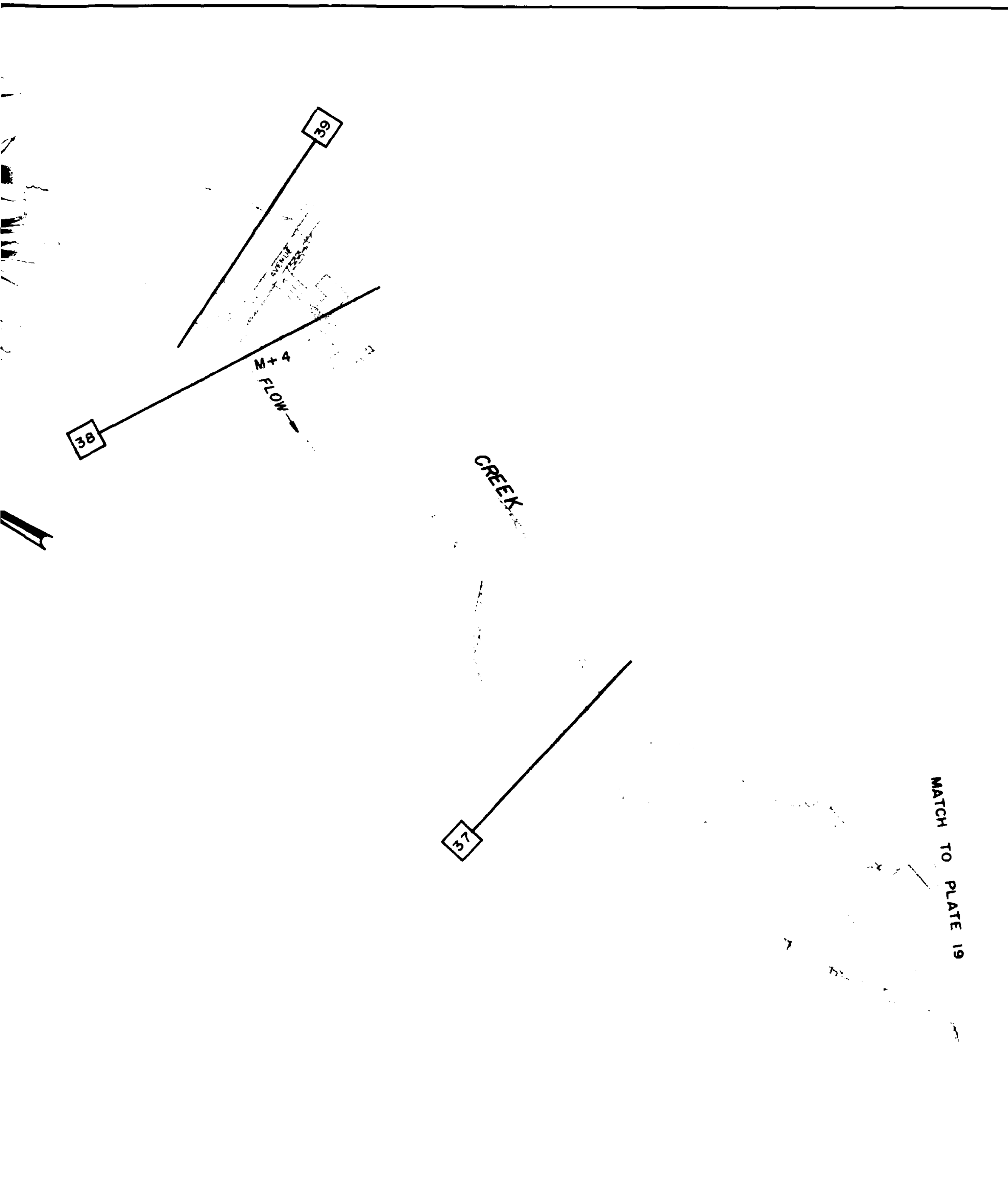
FLOOD PLAIN INFORMATION

SHABAKUNK CREEK
MERCER COUNTY
NEW JERSEY

FLOODED AREAS
WEST BRANCH SHABAKUNK CREEK

PLATE 19


WEST
BRANCH
SHABAKUNK
40
38
MATCH TO PLATE 21



39

NOTES

1. MA
ME

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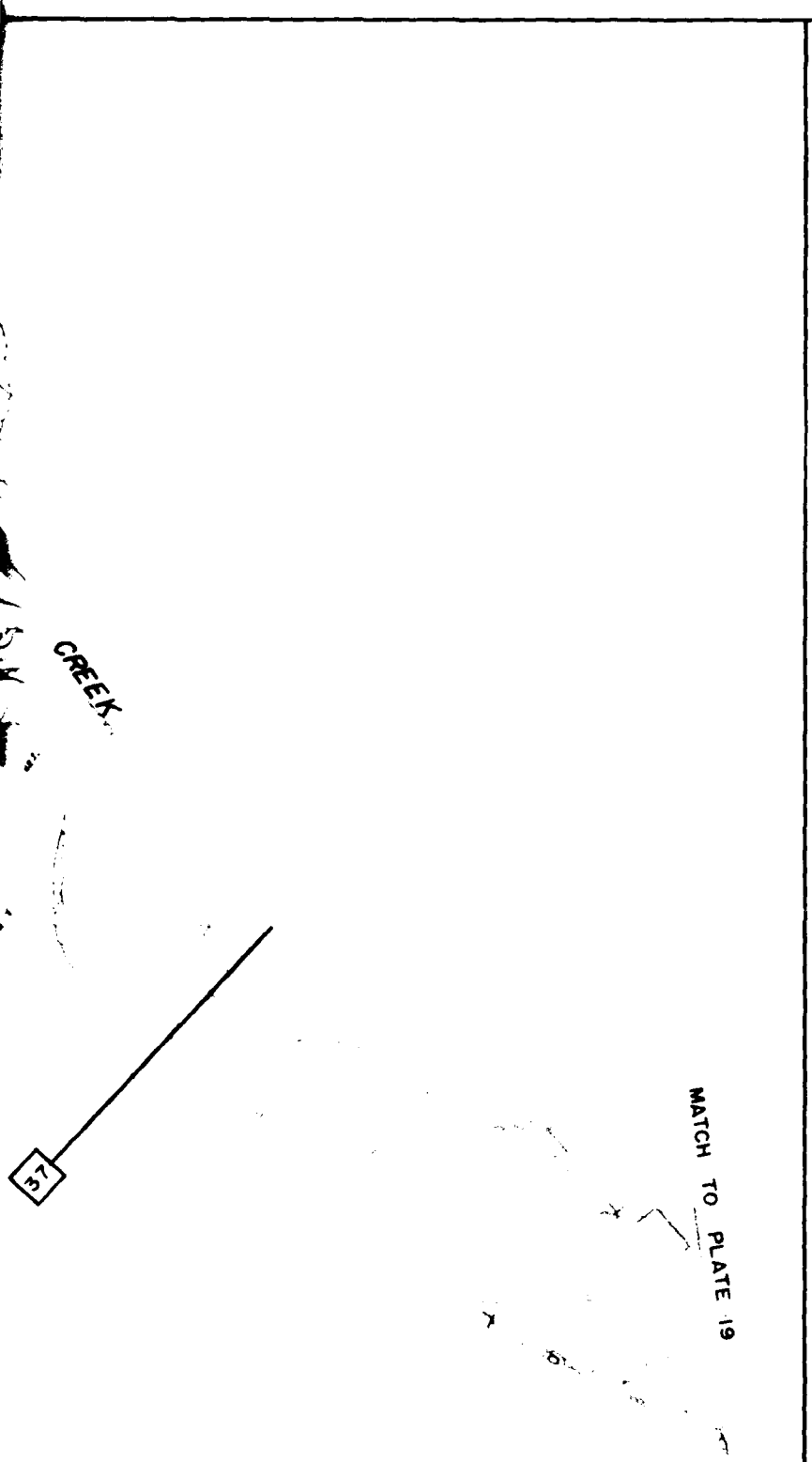
TH

3. AR
SU

4. MI

PHILA



LEGEND

OVERFLOW LIMITS

N.J. FLOODWAY	STANDARD PROJECT FLOOD
DESIGN FLOOD	

M+4 MILES ABOVE MOUTH

39 CROSS SECTION

GROUND ELEVATION IN FEET SEA LEVEL DATUM

NOTES

1. MAPS BASED ON TOPOGRAPHIC MAPS SUPPLIED BY MERCER COUNTY, N.J.
2. LIMITS OF OVERFLOW SHOWN MAY VARY FROM ACTUAL LOCATION ON GROUND AS EXPLAINED IN THE REPORT.
3. AREAS OUTSIDE THE FLOOD PLAIN MAY BE SUBJECT TO FLOODING FROM LOCAL RUNOFF.
4. MINIMUM COUNTOUR INTERVAL IS 2 FT.

SCALE IN FEET

0 200 400

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

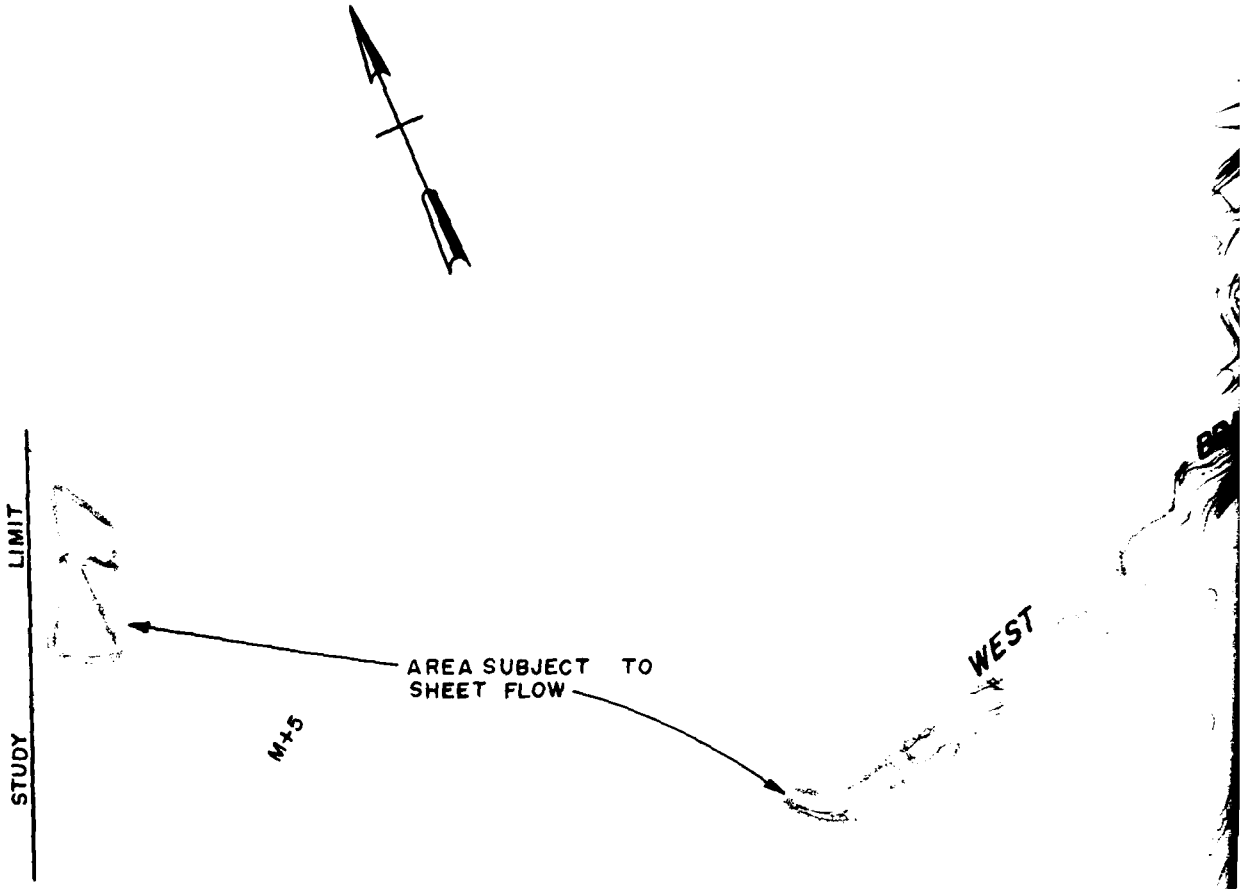
FLOOD PLAIN INFORMATION

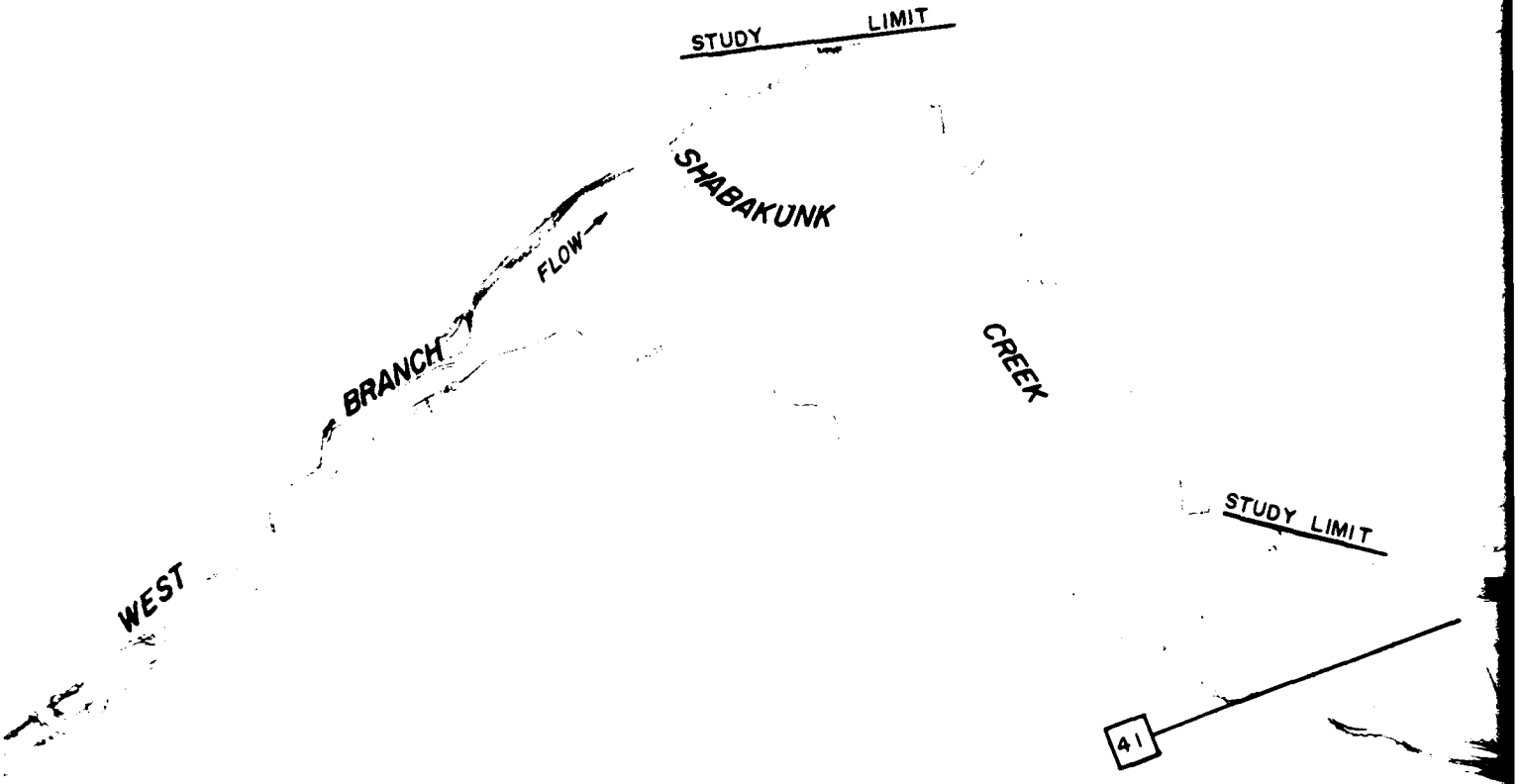
SHABAKUNK CREEK
MERCER COUNTY
NEW JERSEY

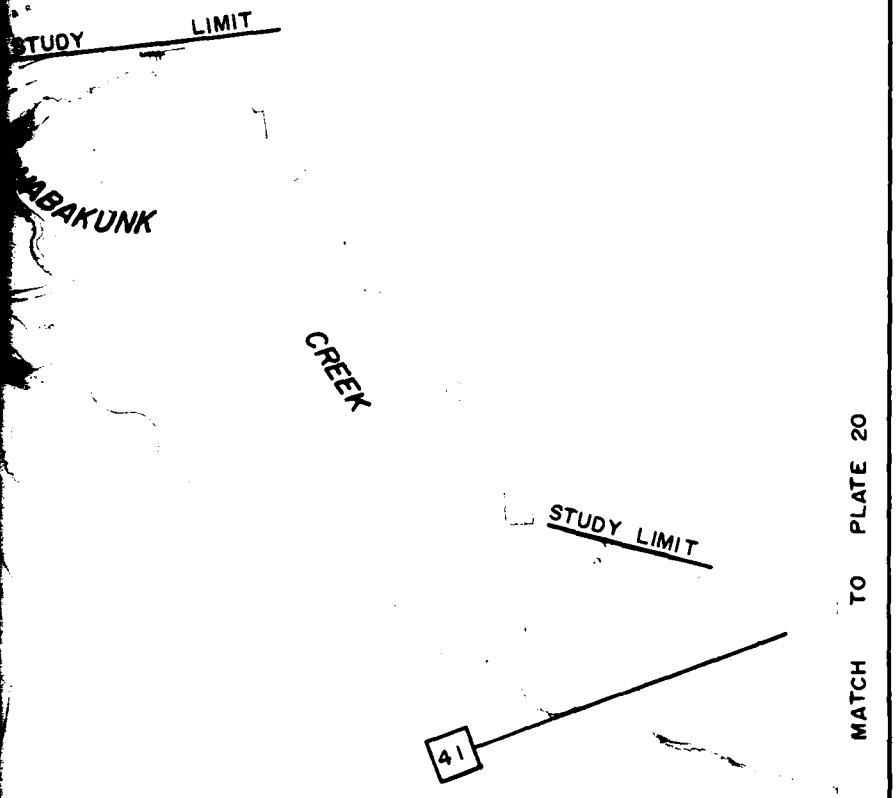
FLOODED AREAS

WEST BRANCH SHABAKUNK CREEK

PLATE 20


STUDY LIMIT
AREA SUBJECT TO SHEET FLOW
M+5
WEST


STUDY LIMIT
SHABAKUNK
FLOW
BRANCH
CREEK
WEST
STUDY LIMIT
41



LEGEND

OVERFLOW LIMITS

N.J. FLOODWAY	STANDARD
DESIGN	PROJECT
FLOOD	FLOOD

M+5 MILES ABOVE MOUTH

41 CROSS SECTION

GROUND ELEVATION IN FEET
SEA LEVEL DATUM

NOTES

1. MAPS BASED ON TOPOGRAPHIC MAPS SUPPLIED BY MERCER COUNTY, N.J.
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3. AREAS OUTSIDE THE FLOOD PLAIN MAY BE SUBJECT TO FLOODING FROM LOCAL RUNOFF.
4. MINIMUM COUNTOUR INTERVAL IS 2 FT.

SCALE IN FEET

0 200 400

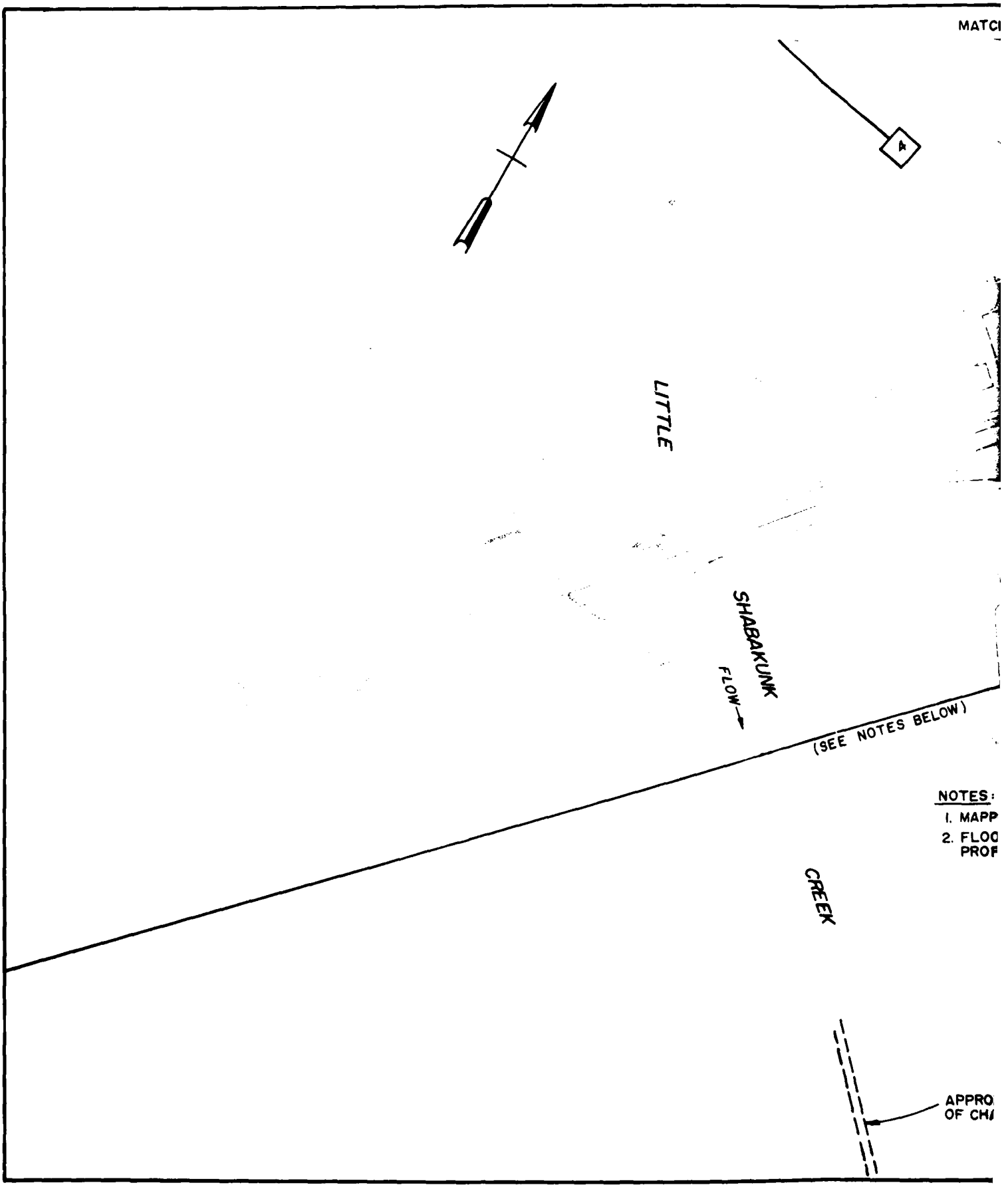
DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

FLOOD PLAIN INFORMATION

SHABAKUNK CREEK
MERCER COUNTY
NEW JERSEY

FLOODED AREAS
WEST BRANCH SHABAKUNK CREEK

PLATE 21


MATCH
A
LITTLE
SHABAKUNK
FLOW
(SEE NOTES BELOW)
NOTES:
1. MAPP
2. FLOO
PROF
CREEK
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OF CH

MATCH TO PLATE 23

NOTES:

1. MAPPING NOT PROVIDED FOR THIS AREA.
2. FLOOD HEIGHTS CAN BE OBTAINED FROM PROFILE PLATE 30.

APPROXIMATE RELOCATION OF CHANNEL

4

NOTES

1. MAPS BASI
   MERCER C
2. LIMITS O
   ACTUAL LI
   THE REPO
3. AREAS OU
   SUBJECT
4. MINIMUM

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THIS AREA.
TAINED FROM

LEGEND

OVERFLOW LIMITS

N.J. FLOODWAY	STANDARD
DESIGN	PROJECT
FLOOD	FLOOD

4 — CROSS SECTION

GROUND ELEVATION IN FEET
SEA LEVEL DATUM

U.S. ROUTE

NOTES

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4. MINIMUM COUNTOUR INTERVAL IS 2 FT.

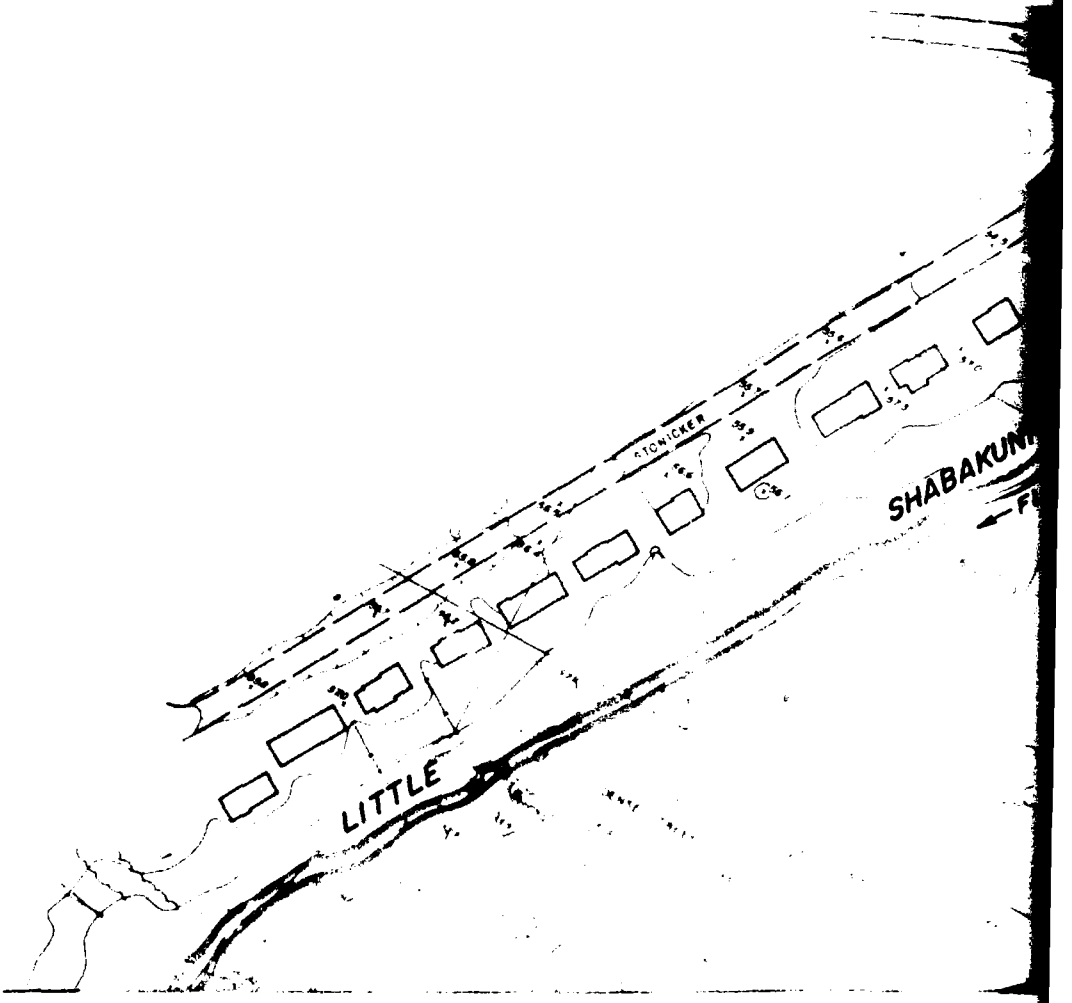
SCALE IN FEET

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

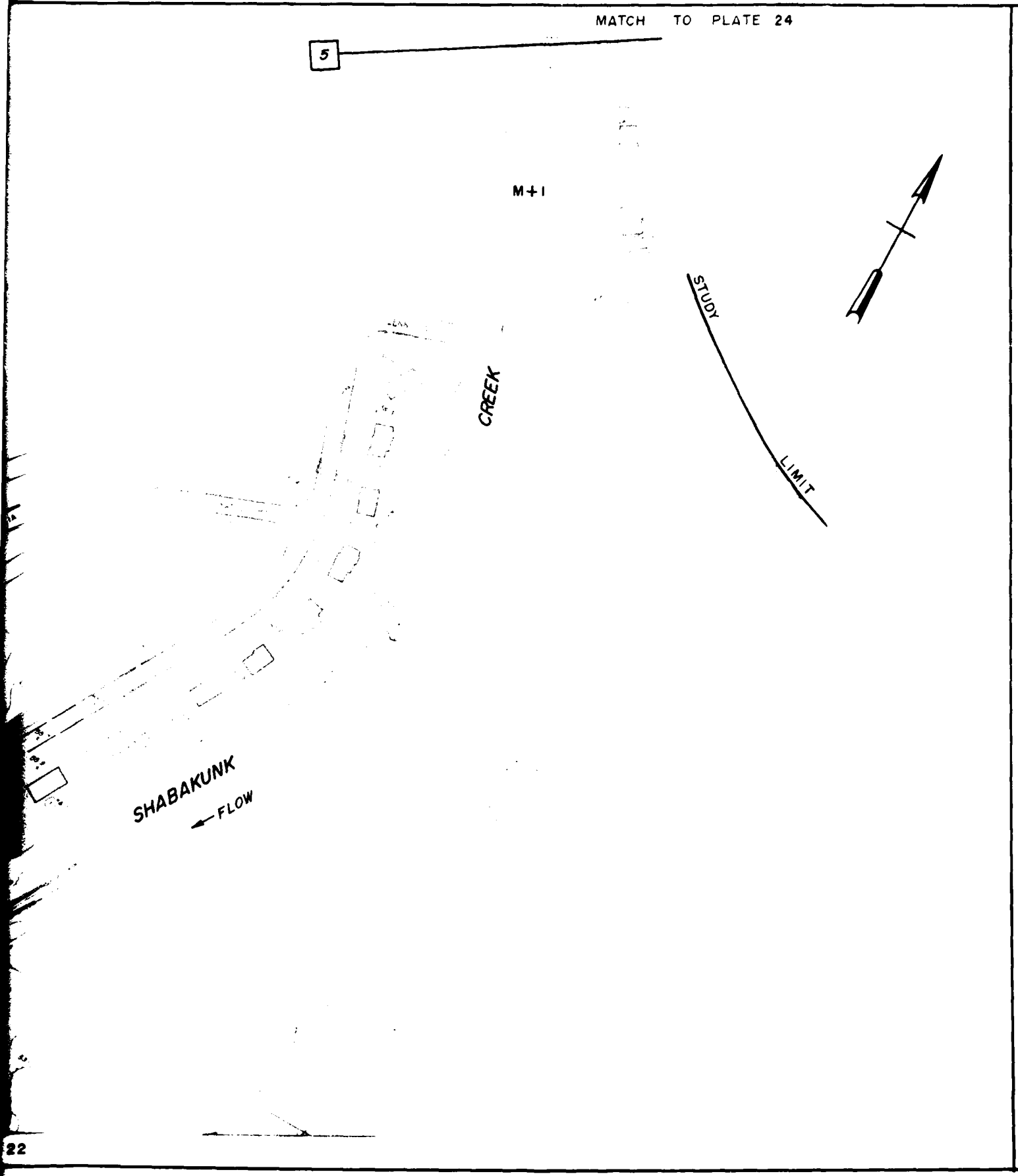
FLOOD PLAIN INFORMATION

SHABAKUNK CREEK
MERCER COUNTY
NEW JERSEY

FLOODED AREAS
LITTLE SHABAKUNK CREEK



MATCH TO PLATE 22



NOTES

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3. A
S

4. M

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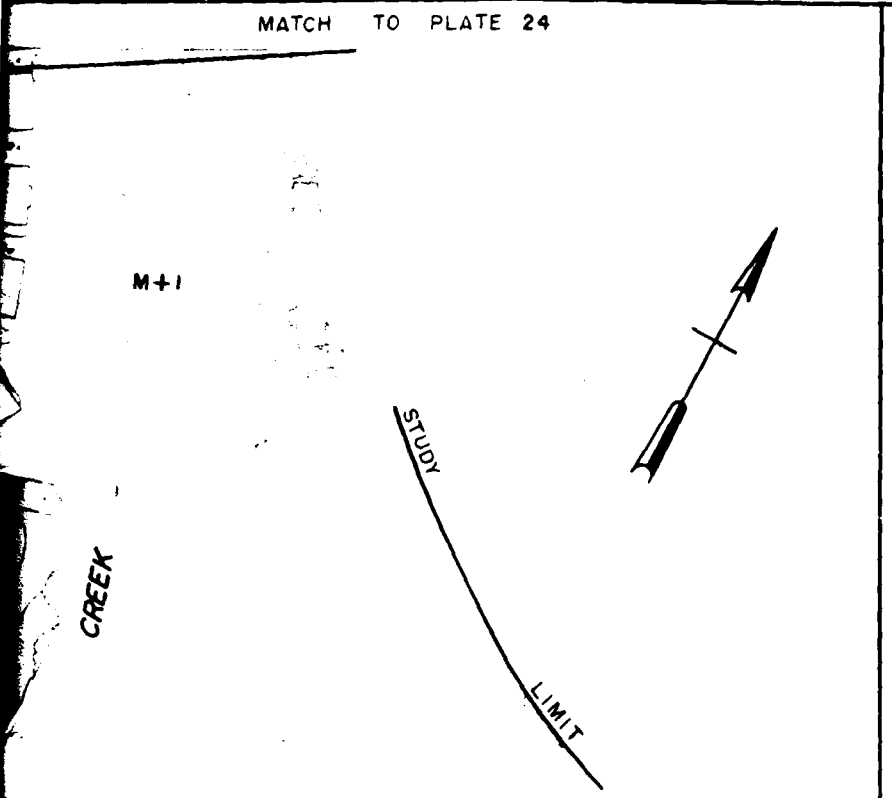

LEGEND

OVERFLOW LIMITS

N.J. FLOODWAY	STANDARD PROJECT FLOOD
DESIGN FLOOD	

M+1 MILES ABOVE MOUTH

5 CROSS SECTION

GROUND ELEVATION IN FEET SEA LEVEL DATUM

NOTES

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4. MINIMUM COUNTOUR INTERVAL IS 2 FT.

SCALE IN FEET

0 200 400

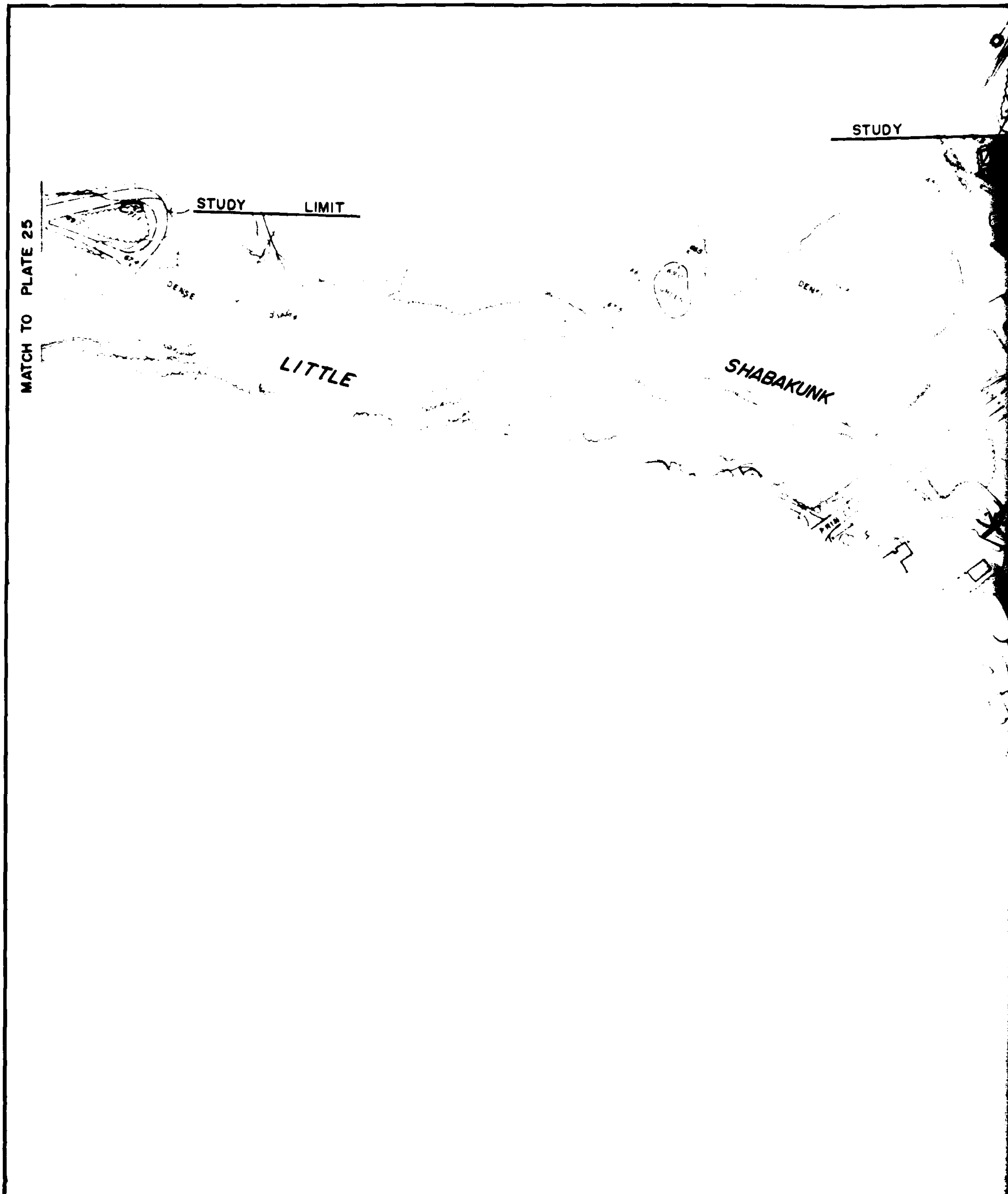
DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

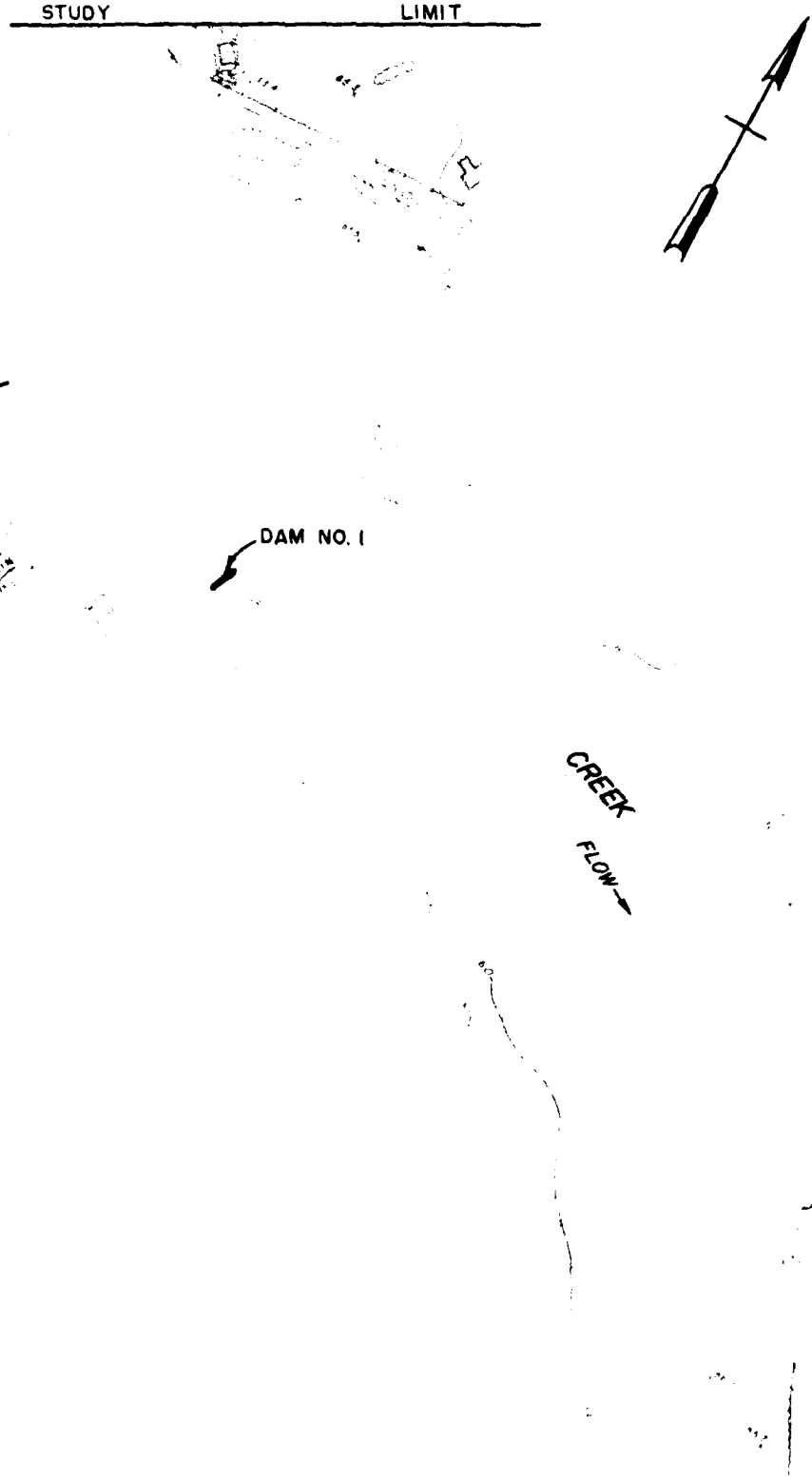
FLOOD PLAIN INFORMATION

SHABAKUNK CREEK
MERCER COUNTY
NEW JERSEY

FLOODED AREAS
LITTLE SHABAKUNK CREEK

3


MATCH TO PLATE 25
STUDY
LIMIT
STUDY
DENSE
LITTLE
SHABAKUNK



NOTES

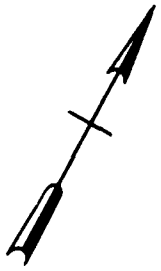
1. MA
ME

2. LI
AC
TH

3. AR
SU

4. ME

PHI



CREEK

FLOW

MATCH TO PLATE 23

LEGEND

OVERFLOW LIMITS

N.J. FLOODWAY DESIGN FLOOD	STANDARD PROJECT FLOOD

GROUND ELEVATION IN FEET
SEA LEVEL DATUM

NOTES

1. MAPS BASED ON TOPOGRAPHIC MAPS SUPPLIED BY MERCER COUNTY, N.J.
2. LIMITS OF OVERFLOW SHOWN MAY VARY FROM ACTUAL LOCATION ON GROUND AS EXPLAINED IN THE REPORT.
3. AREAS OUTSIDE THE FLOOD PLAIN MAY BE SUBJECT TO FLOODING FROM LOCAL RUNOFF.
4. MINIMUM COUNTOUR INTERVAL IS 2 FT.

SCALE IN FEET

0 200 400

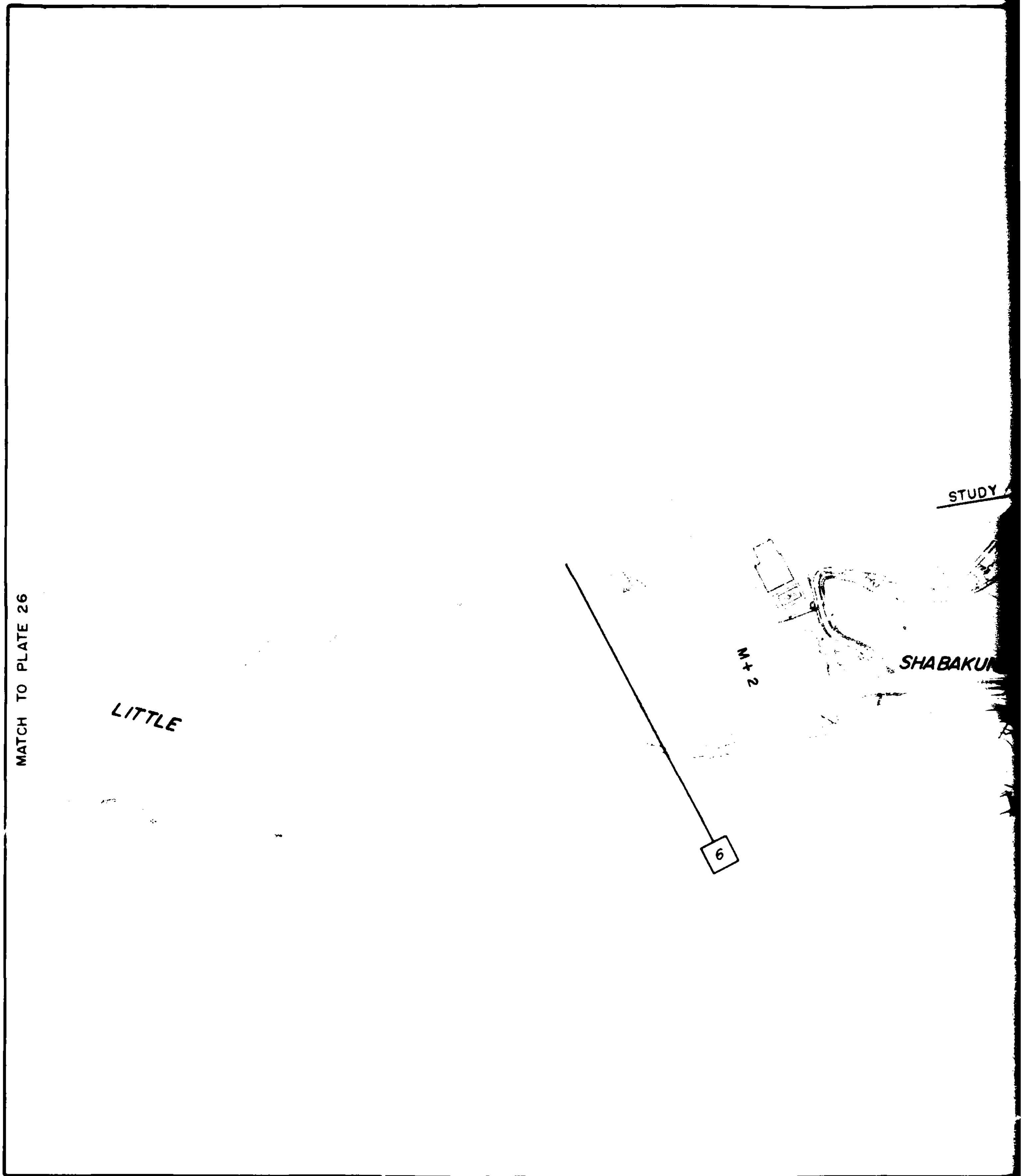
DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

FLOOD PLAIN INFORMATION

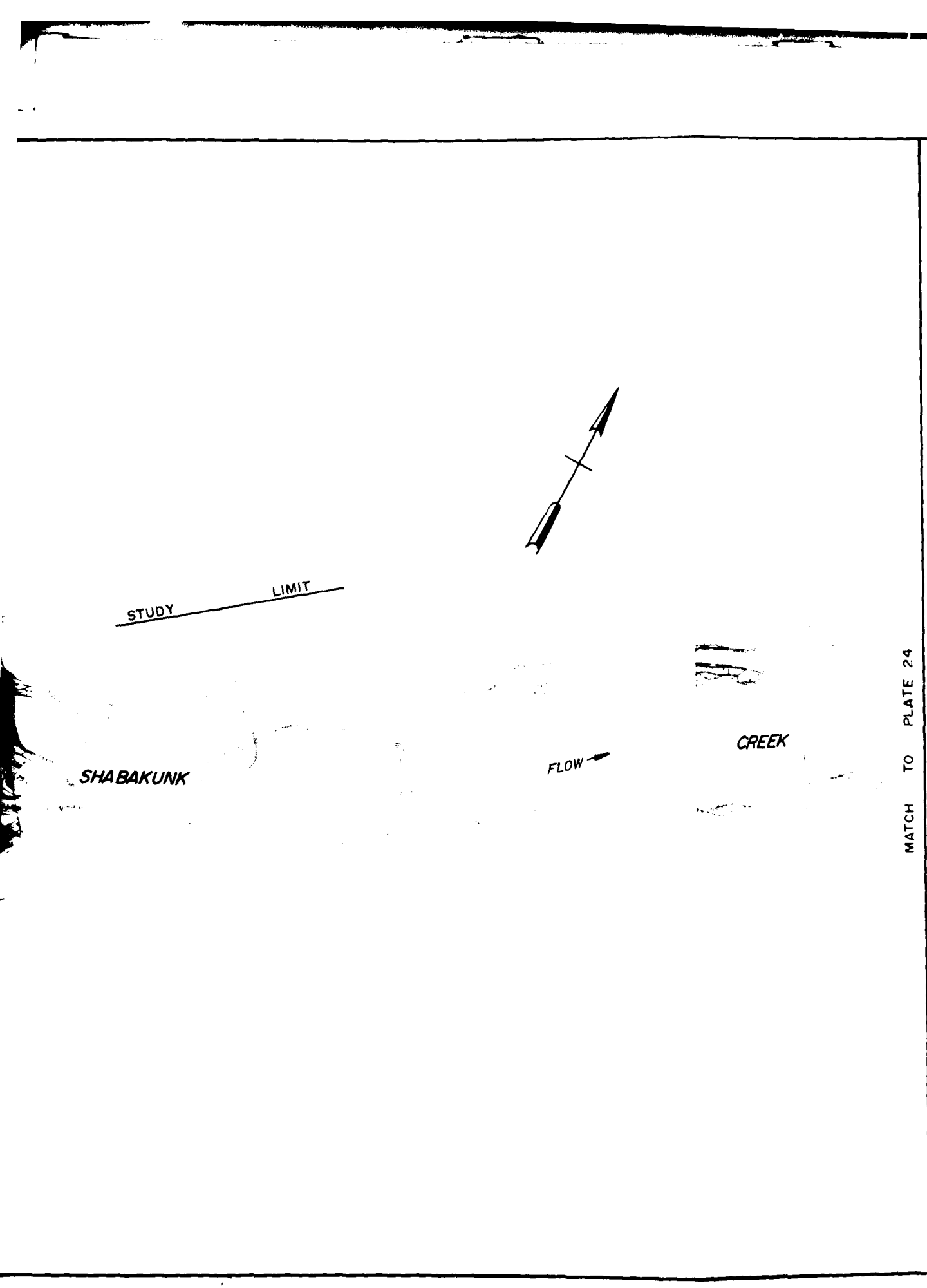
SHABAKUNK CREEK
MERCER COUNTY
NEW JERSEY

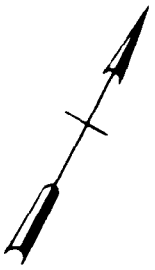
FLOODED AREAS
LITTLE SHABAKUNK CREEK

PLATE 24



MATCH TO PLATE 26
LITTLE
M + 2
SHABAKU
STUDY
6


STUDY LIMIT
SHABAKUNK
FLOW
CREEK
MATCH TO PLATE 24
M + 2
6
NOTES
1. MAPS BASE
MERCER CO
2. LIMITS OF
ACTUAL LO
THE REPOR
3. AREAS OUT
SUBJECT T
4. MINIMUM
0
PHILADELPH
P
F



CREEK

FLOW

MATCH TO PLATE 24

LEGEND

OVERFLOW LIMITS

N.J. FLOODWAY	STANDARD
DESIGN	PROJECT
FLOOD	FLOOD

M + 2 — MILES ABOVE MOUTH

6 — CROSS SECTION

GROUND ELEVATION IN FEET
SEA LEVEL DATUM

NOTES

1. MAPS BASED ON TOPOGRAPHIC MAPS SUPPLIED BY MERCER COUNTY, N.J
2. LIMITS OF OVERFLOW SHOWN MAY VARY FROM ACTUAL LOCATION ON GROUND AS EXPLAINED IN THE REPORT.
3. AREAS OUTSIDE THE FLOOD PLAIN MAY BE SUBJECT TO FLOODING FROM LOCAL RUNOFF.
4. MINIMUM COUNTOUR INTERVAL IS 2 FT

SCALE IN FEET

0 200 400

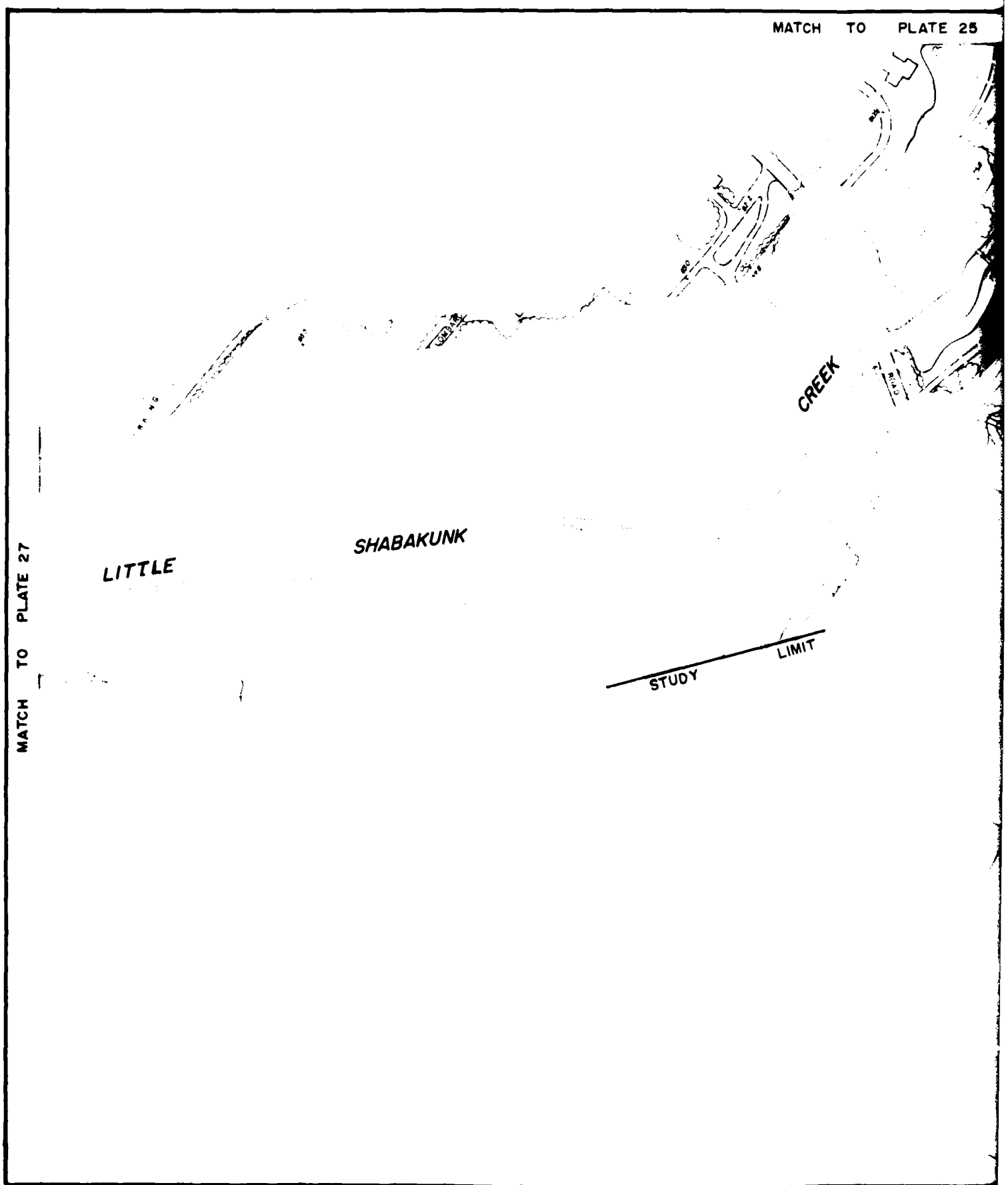
DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

FLOOD PLAIN INFORMATION

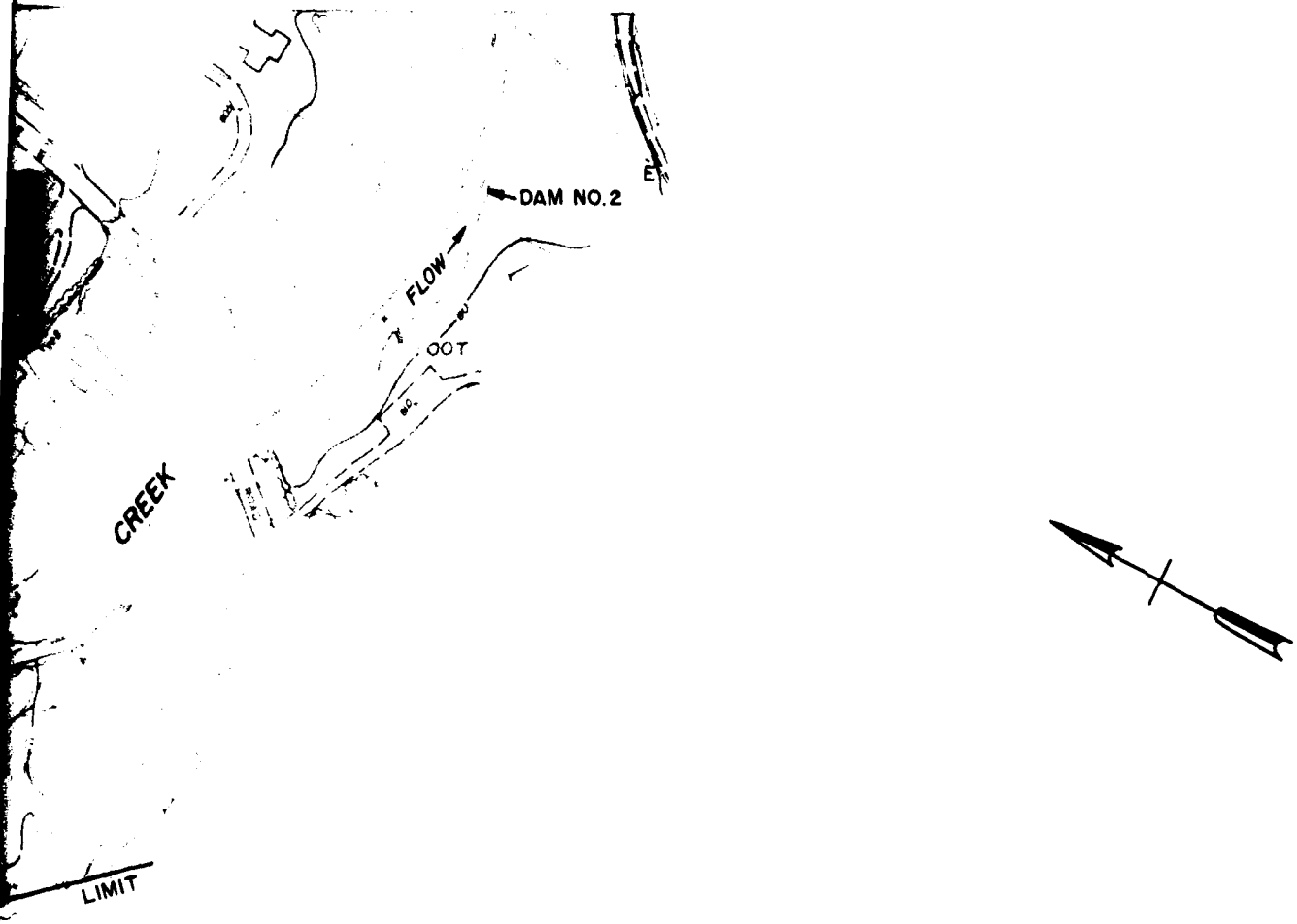
SHABAKUNK CREEK
MERCER COUNTY
NEW JERSEY

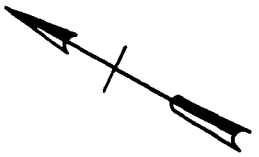
FLOODED AREAS
LITTLE SHABAKUNK CREEK

PLATE 25


MATCH TO PLATE 25
CREEK
SHABAKUNK
LITTLE
STUDY LIMIT
MATCH TO PLATE 27

MATCH TO PLATE 25





LEGEND

OVERFLOW LIMITS

N.J. FLOODWAY	STANDARD
DESIGN	PROJECT
FLOOD	FLOOD

GROUND ELEVATION IN FEET
SEA LEVEL DATUM

206 U.S. ROUTE

NOTES

1. MAPS BASED ON TOPOGRAPHIC MAPS SUPPLIED BY MERCER COUNTY, N.J.
2. LIMITS OF OVERFLOW SHOWN MAY VARY FROM ACTUAL LOCATION ON GROUND AS EXPLAINED IN THE REPORT.
3. AREAS OUTSIDE THE FLOOD PLAIN MAY BE SUBJECT TO FLOODING FROM LOCAL RUNOFF.
4. MINIMUM COUNTOUR INTERVAL IS 2 FT.

SCALE IN FEET

0 200 400

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

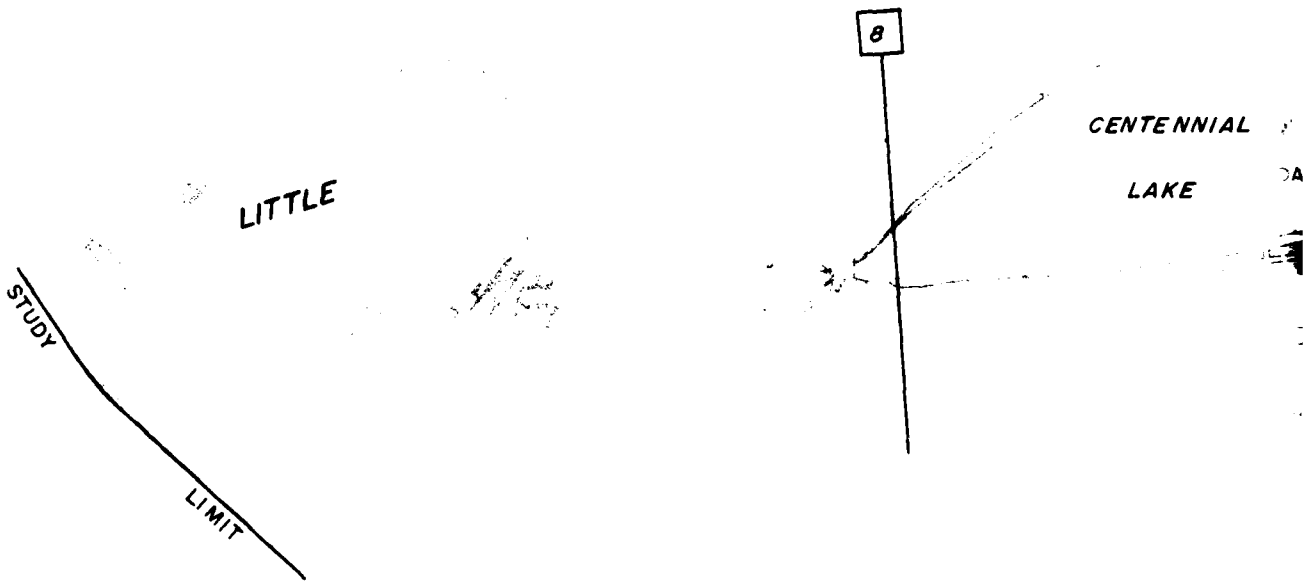
FLOOD PLAIN INFORMATION

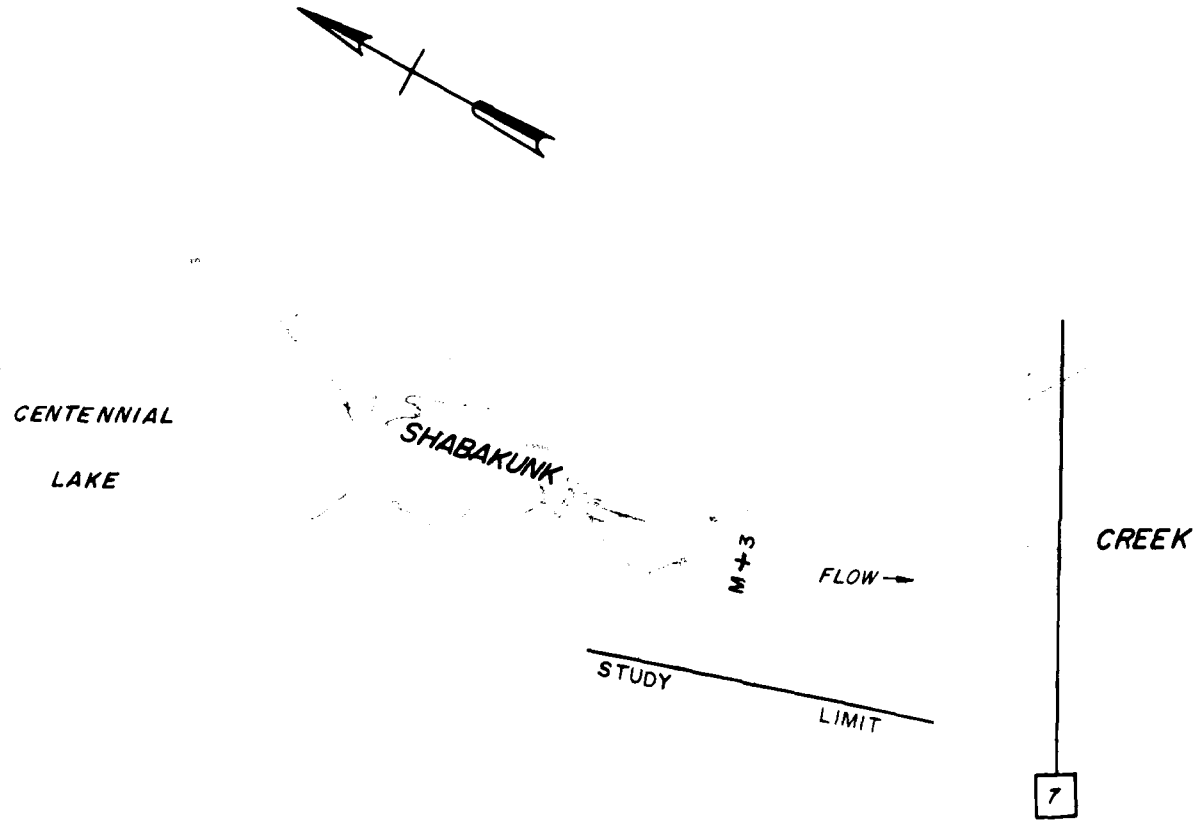
SHABAKUNK CREEK
MERCER COUNTY
NEW JERSEY

FLOODED AREAS

LITTLE SHABAKUNK CREEK

PLATE 26


8
CENTENNIAL
LAKE
LITTLE
STUDY
LIMIT



MATCH TO PLATE 26

M+3

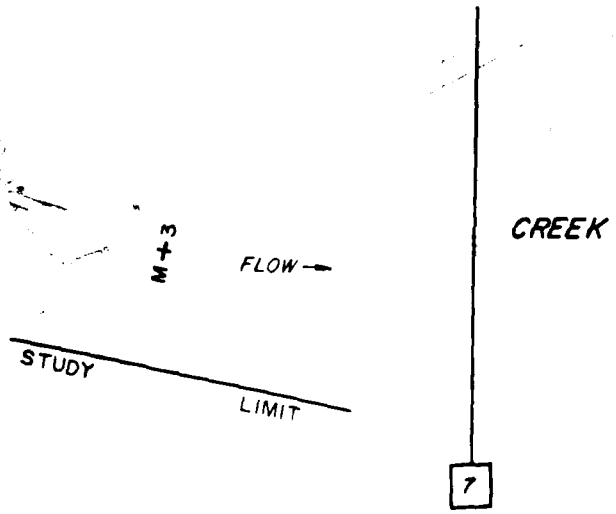
8

NOTES

1. MAPS BAS
   MERCER C
2. LIMITS
   ACTUAL L
   THE REPO
3. AREAS ON
   SUBJECT
4. MINIMUM

0

PHILADELPH



MATCH TO PLATE 26

LEGEND

OVERFLOW LIMITS

N.J. FLOODWAY	STANDARD PROJECT FLOOD
DESIGN FLOOD	

M+3 MILES ABOVE MOUTH

8 CROSS SECTION

GROUND ELEVATION IN FEET SEA LEVEL DATUM

NOTES

1. MAPS BASED ON TOPOGRAPHIC MAPS SUPPLIED BY MERCER COUNTY, N.J.
2. LIMITS OF OVERFLOW SHOWN MAY VARY FROM ACTUAL LOCATION ON GROUND AS EXPLAINED IN THE REPORT.
3. AREAS OUTSIDE THE FLOOD PLAIN MAY BE SUBJECT TO FLOODING FROM LOCAL RUNOFF.
4. MINIMUM COUNTOUR INTERVAL IS 2 FT.

SCALE IN FEET

0 200 400

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

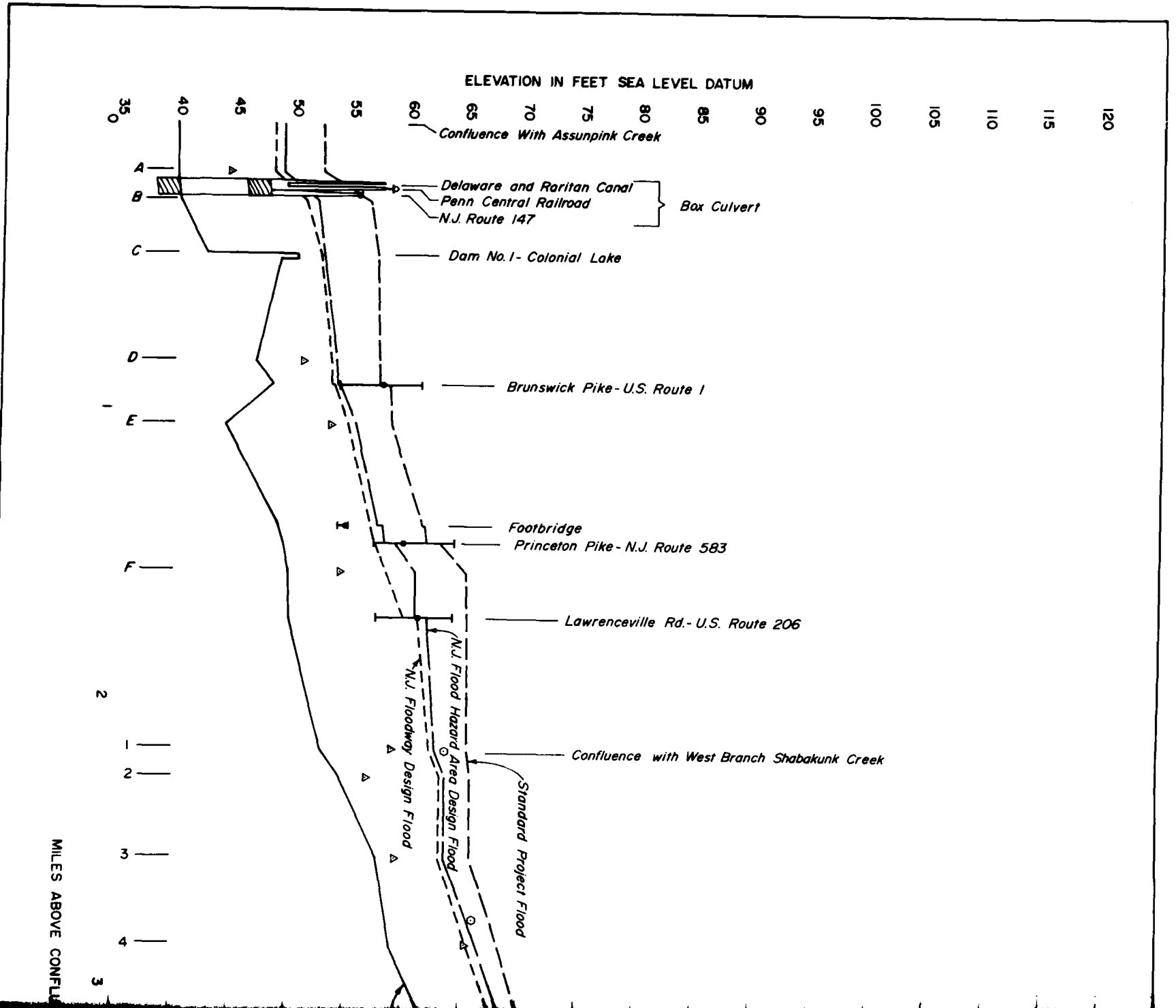
FLOOD PLAIN INFORMATION

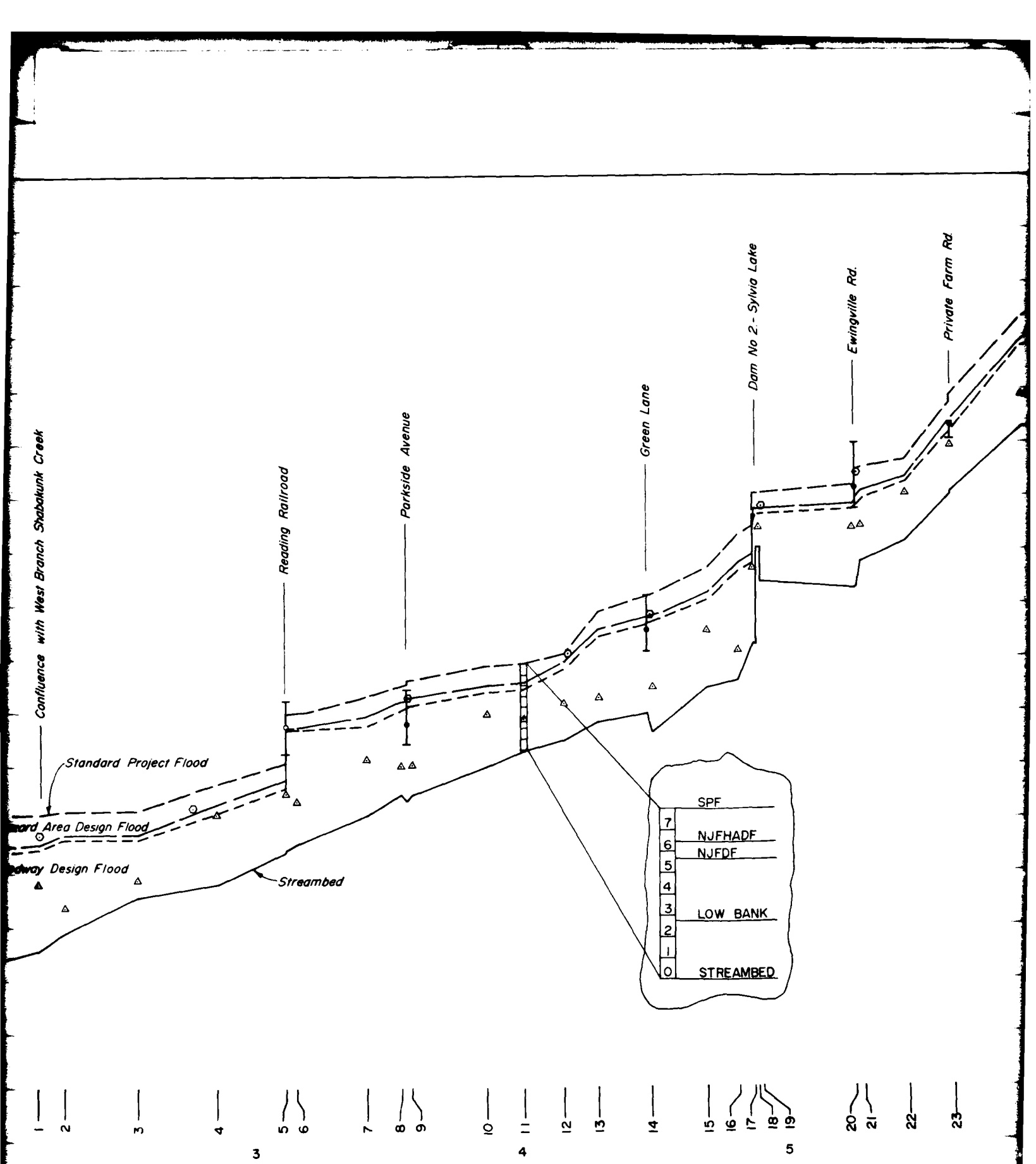
SHABAKUNK CREEK
MERCER COUNTY
NEW JERSEY

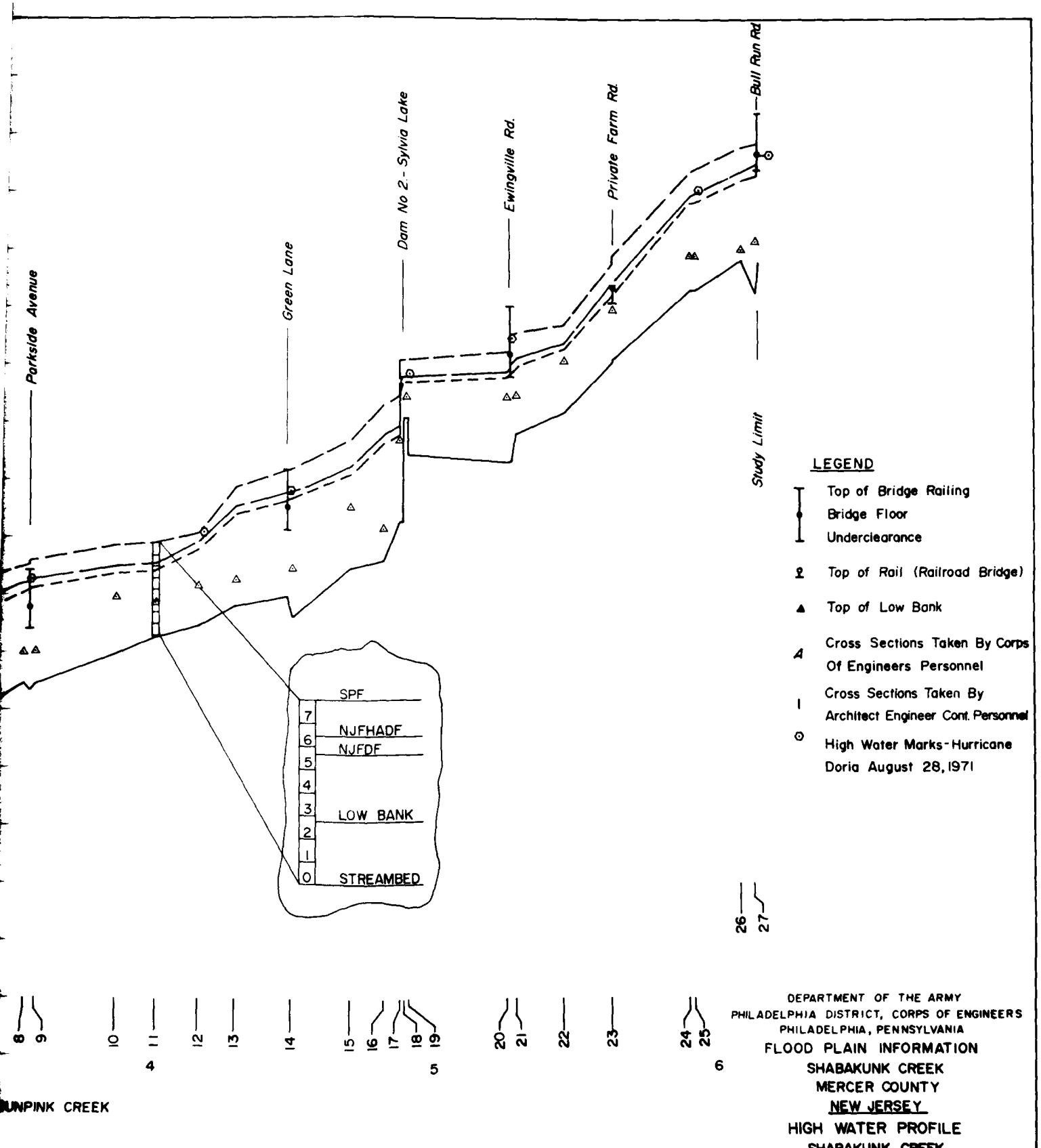
FLOODED AREAS

LITTLE SHABAKUNK CREEK

PLATE 27


ELEVATION IN FEET SEA LEVEL DATUM
35
40
45
50
55
60
65
70
75
80
85
90
95
100
105
110
115
120
Confluence With Assunpink Creek
A
B
C
D
E
F
Delaware and Raritan Canal
Penn Central Railroad
N.J. Route 147
Box Culvert
Dam No. 1 - Colonial Lake
Brunswick Pike - U.S. Route 1
Footbridge
Princeton Pike - N.J. Route 583
Lawrenceville Rd. - U.S. Route 206
N.J. Floodway Design Flood
N.J. Flood Hazard Area Design Flood
Standard Project Flood
Confluence with West Branch Shabakunk Creek
0
1
2
3
4
MILES ABOVE CONFLU


Confluence with West Branch Shabakunk Creek
Reading Railroad
Parkside Avenue
Green Lane
Dam No 2 - Sylvia Lake
Ewingville Rd.
Private Farm Rd.
Standard Project Flood
rd Area Design Flood
dway Design Flood
Streambed
SPF
7
NJFHADF
6
NJFDF
5
4
3
LOW BANK
2
1
0
STREAMBED
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
3
4
5
MILES ABOVE CONFLUENCE WITH ASSUNPINK CREEK



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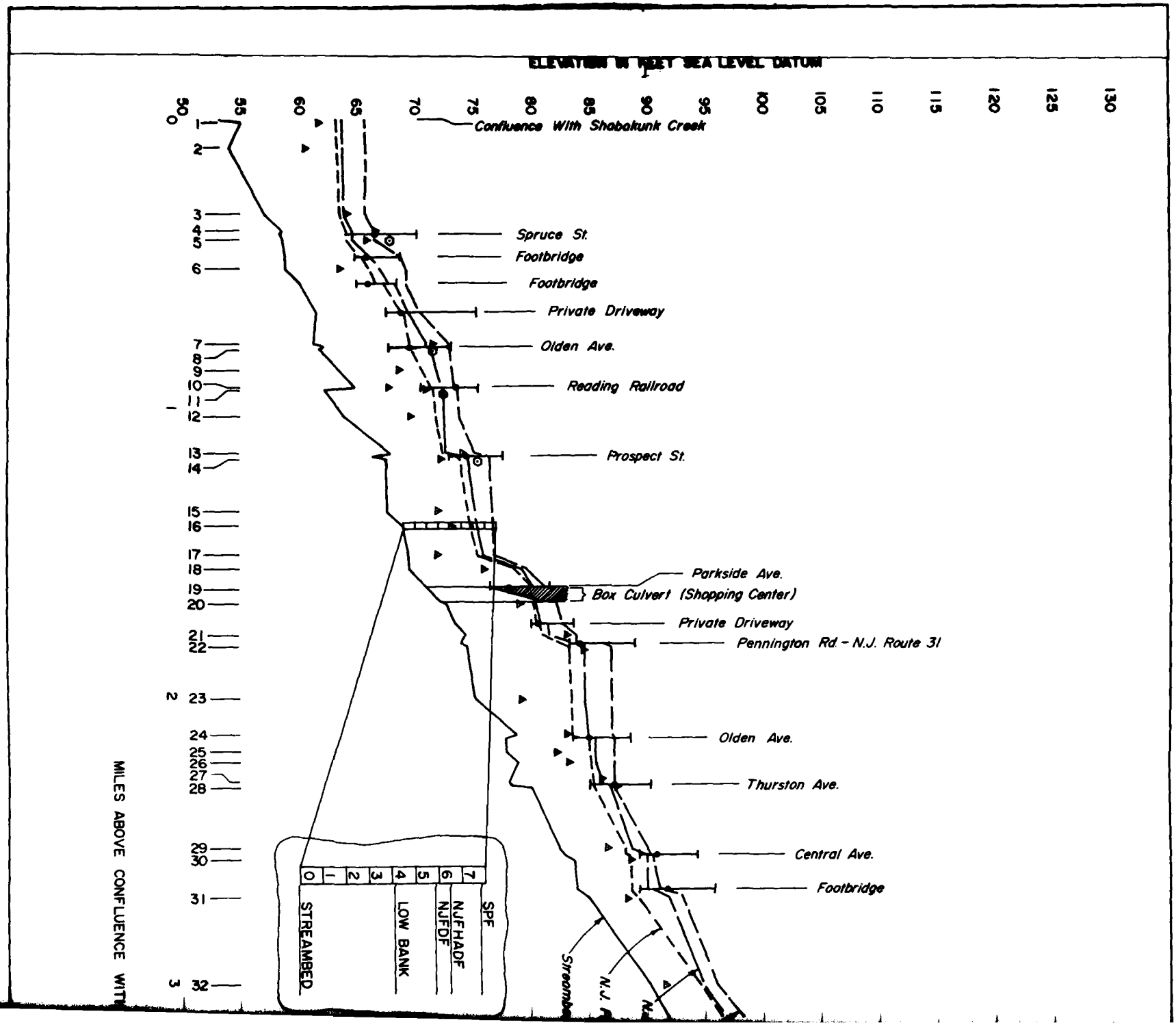
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

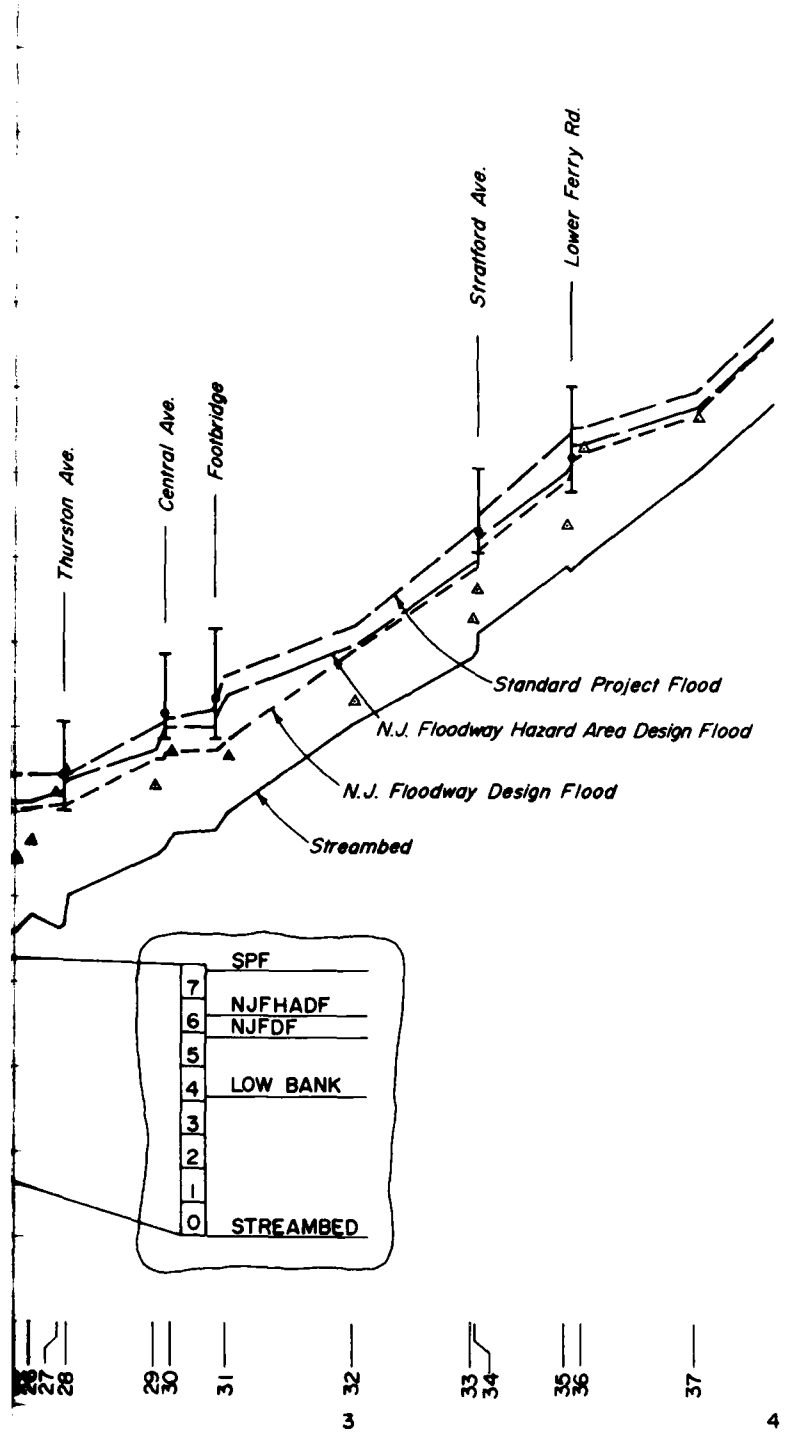
FLOOD PLAIN INFORMATION
SHABAKUNK CREEK
MERCER COUNTY
NEW JERSEY

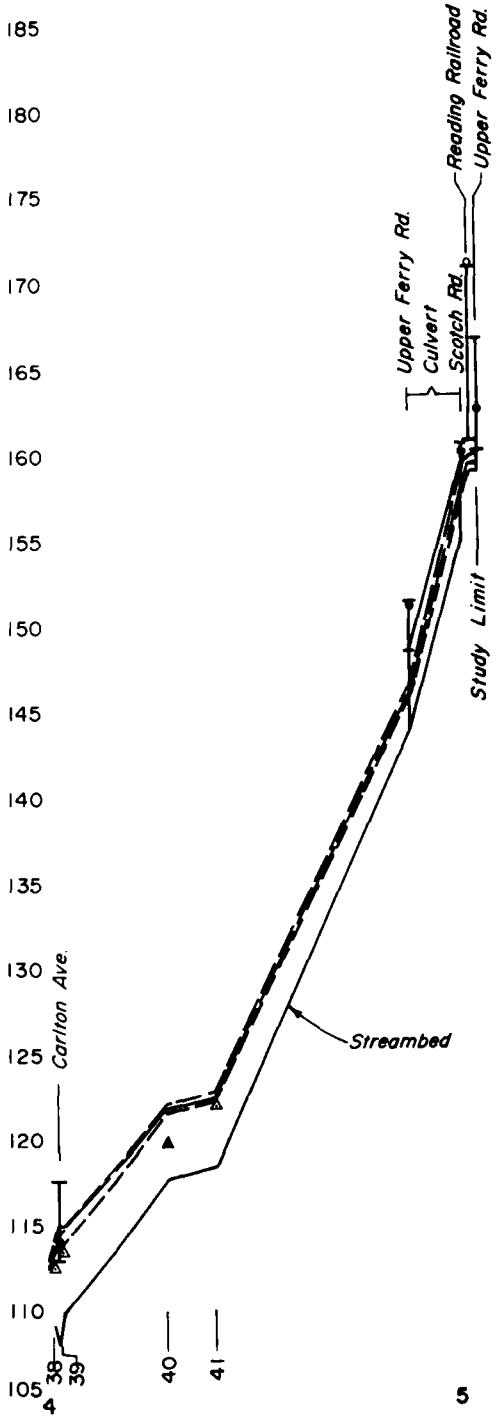
HIGH WATER PROFILE
SHABAKUNK CREEK

PLATE 28

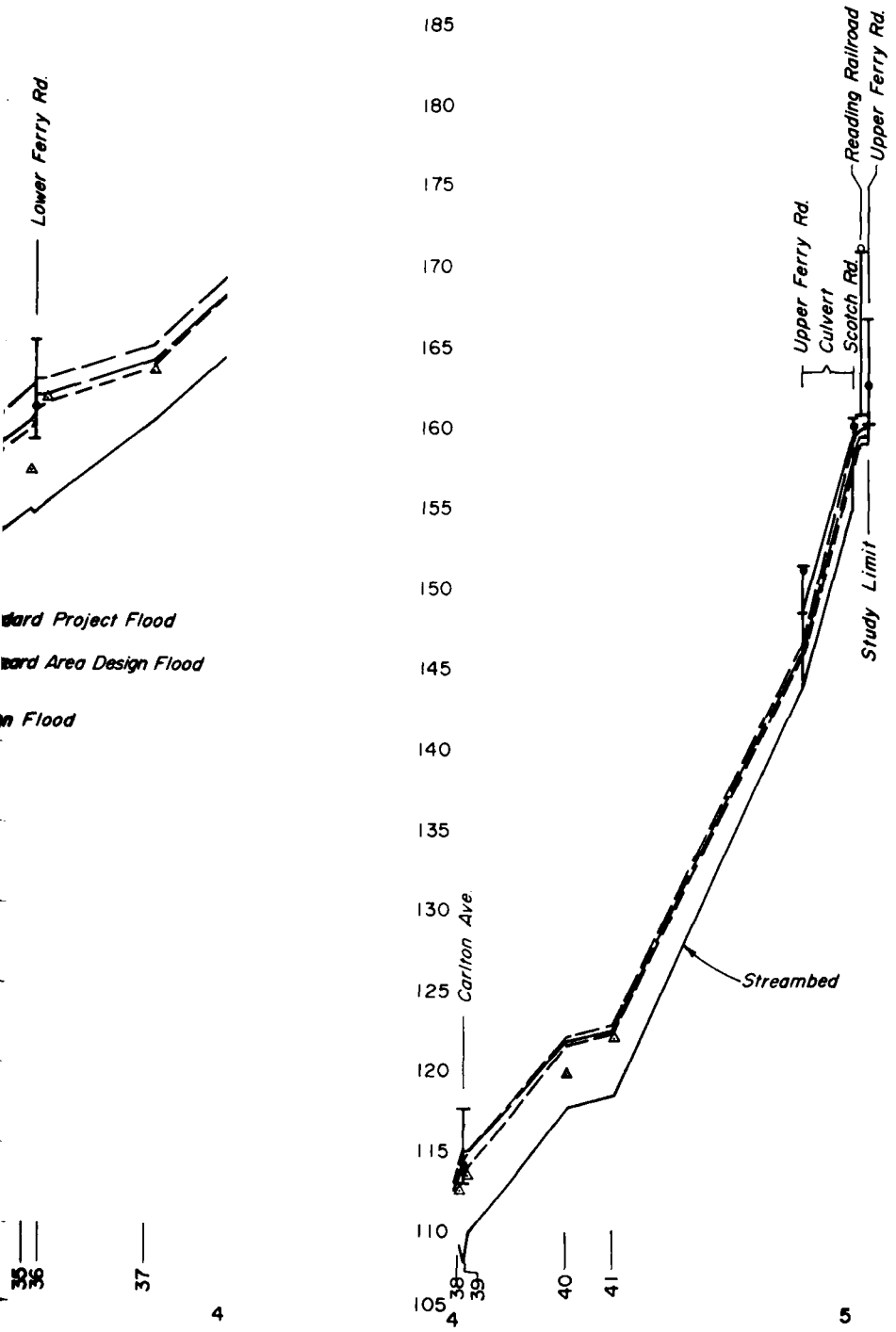
3


ELEVATION IN FEET SEA LEVEL DATUM
50
55
60
65
70
75
80
85
90
95
100
105
110
115
120
125
130
Confluence With Shabakunk Creek
Spruce St.
Footbridge
Footbridge
Private Driveway
Olden Ave.
Reading Railroad
Prospect St.
Parkside Ave.
Box Culvert (Shopping Center)
Private Driveway
Pennington Rd. - N.J. Route 31
Olden Ave.
Thurston Ave.
Central Ave.
Footbridge
MILES ABOVE CONFLUENCE WITH
STREAMBED
LOW BANK
NJFHADF
NJFDF
SPF
0
1
2
3
4
5
6
7
Streambed
N.J.





MILES ABOVE CONFLUENCE WITH SHABAKUNK CREEK



ard Project Flood

ard Area Design Flood

n Flood

CREEK

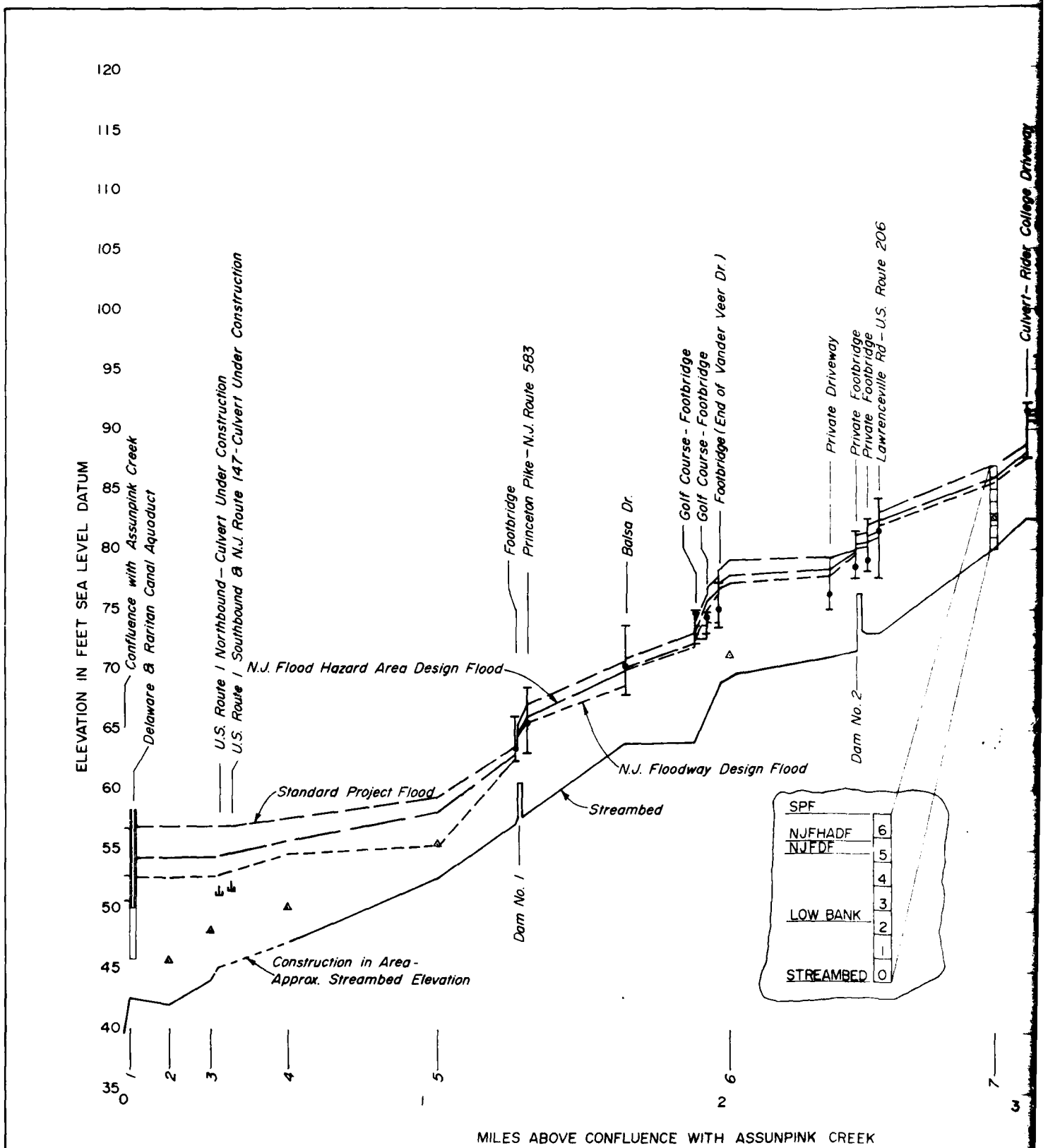
LEGEND

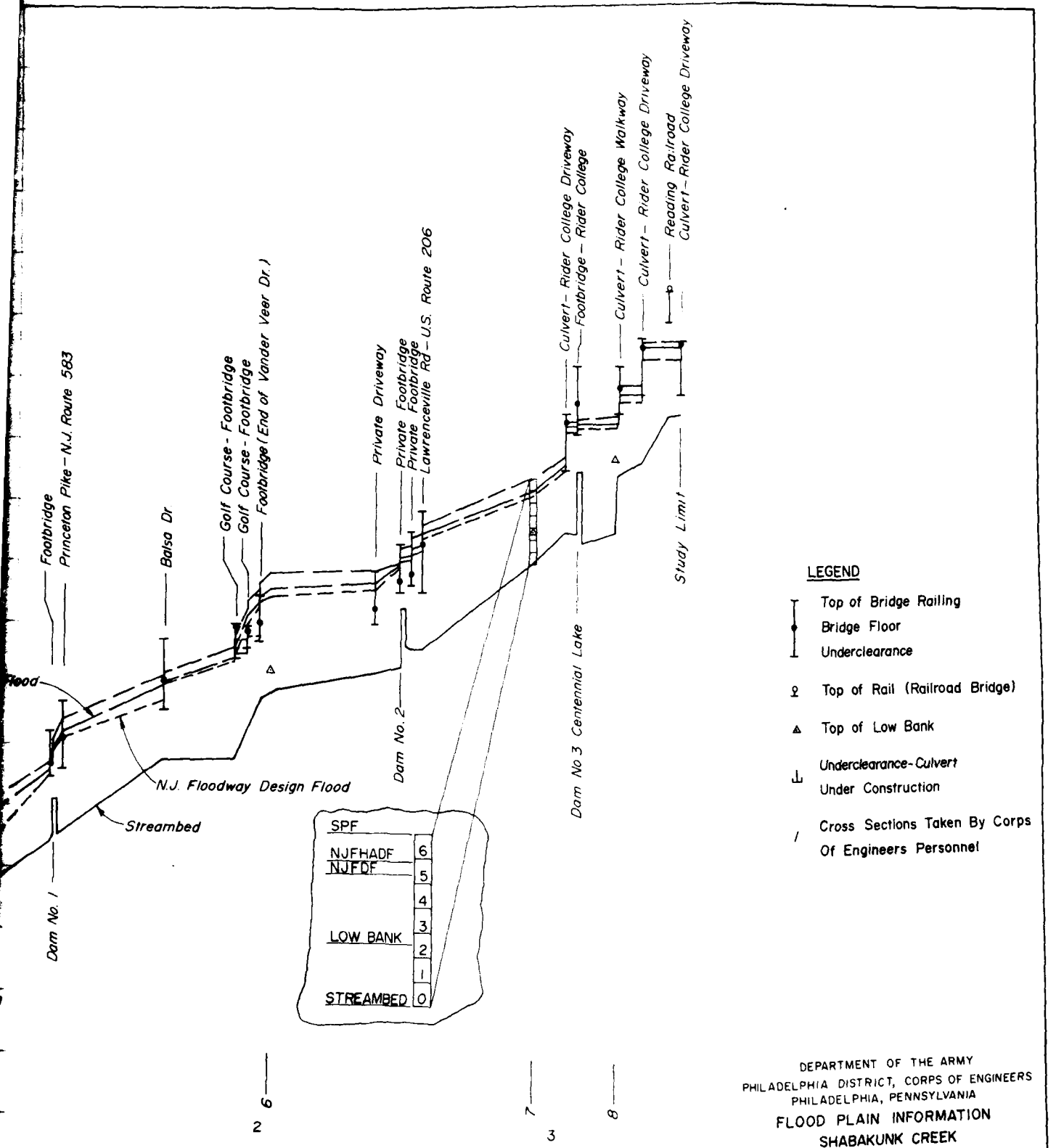
- Top of Bridge Railing
- Bridge Floor
- Underclearance
- Top of Rail (Railroad Bridge)
- Top of Low Bank
- Cross Sections Taken By Architect Engineer Contractor Personnel
- High Water Marks-Hurricane Doria, Aug. 28, 1971

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

FLOOD PLAIN INFORMATION
SHABAKUNK CREEK
MERCER COUNTY
NEW JERSEY
HIGH WATER PROFILE
WEST BRANCH SHABAKUNK CREEK

PLATE 29


ELEVATION IN FEET SEA LEVEL DATUM
120
115
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
Confluence with Assunpink Creek
Delaware & Raritan Canal Aquaduct
U.S. Route 1 Northbound – Culvert Under Construction
U.S. Route 1 Southbound & N.J. Route 147 - Culvert Under Construction
Footbridge
Princeton Pike – N.J. Route 583
Balsa Dr.
Golf Course - Footbridge
Golf Course - Footbridge
Footbridge (End of Vander Veer Dr.)
Private Driveway
Private Footbridge
Private Footbridge
Lawrenceville Rd – U.S. Route 206
Culvert – Rider College Driveway
N.J. Flood Hazard Area Design Flood
Standard Project Flood
N.J. Floodway Design Flood
Streambed
Dam No. 1
Dam No. 2
Construction in Area - Approx. Streambed Elevation
SPF
NJFHADF
NJFDF
LOW BANK
STREAMBED
6
5
4
3
2
1
0
0
1
2
3
4
5
6
7
MILES ABOVE CONFLUENCE WITH ASSUNPINK CREEK

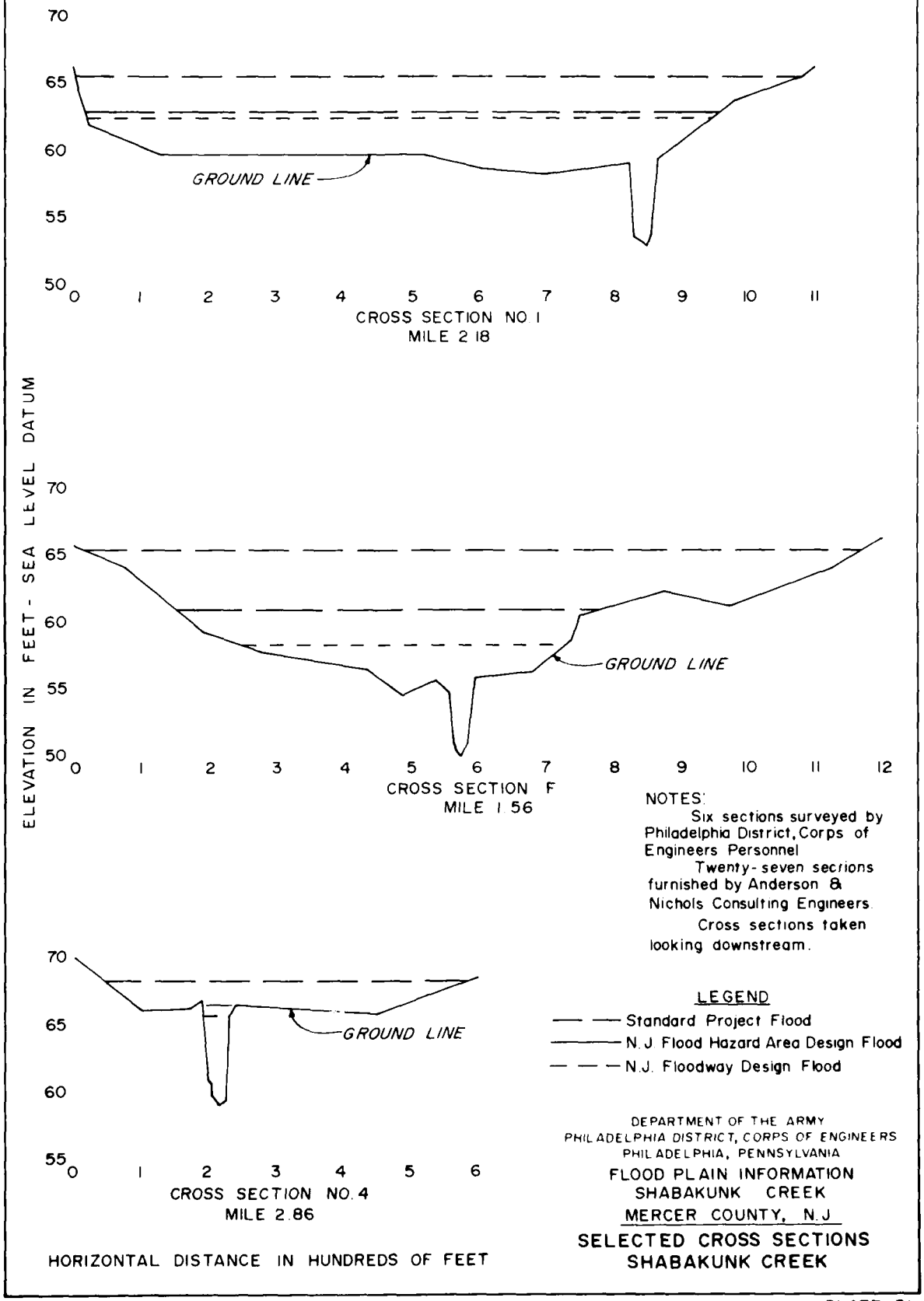


DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

FLOOD PLAIN INFORMATION
SHABAKUNK CREEK
MERCER COUNTY
NEW JERSEY

HIGH WATER PROFILE
LITTLE SHABAKUNK CREEK

PLATE 30



NOTES:

Six sections surveyed by Philadelphia District, Corps of Engineers Personnel

Twenty-seven sections furnished by Anderson & Nichols Consulting Engineers.

Cross sections taken looking downstream.

LEGEND

— — Standard Project Flood

——— N.J. Flood Hazard Area Design Flood

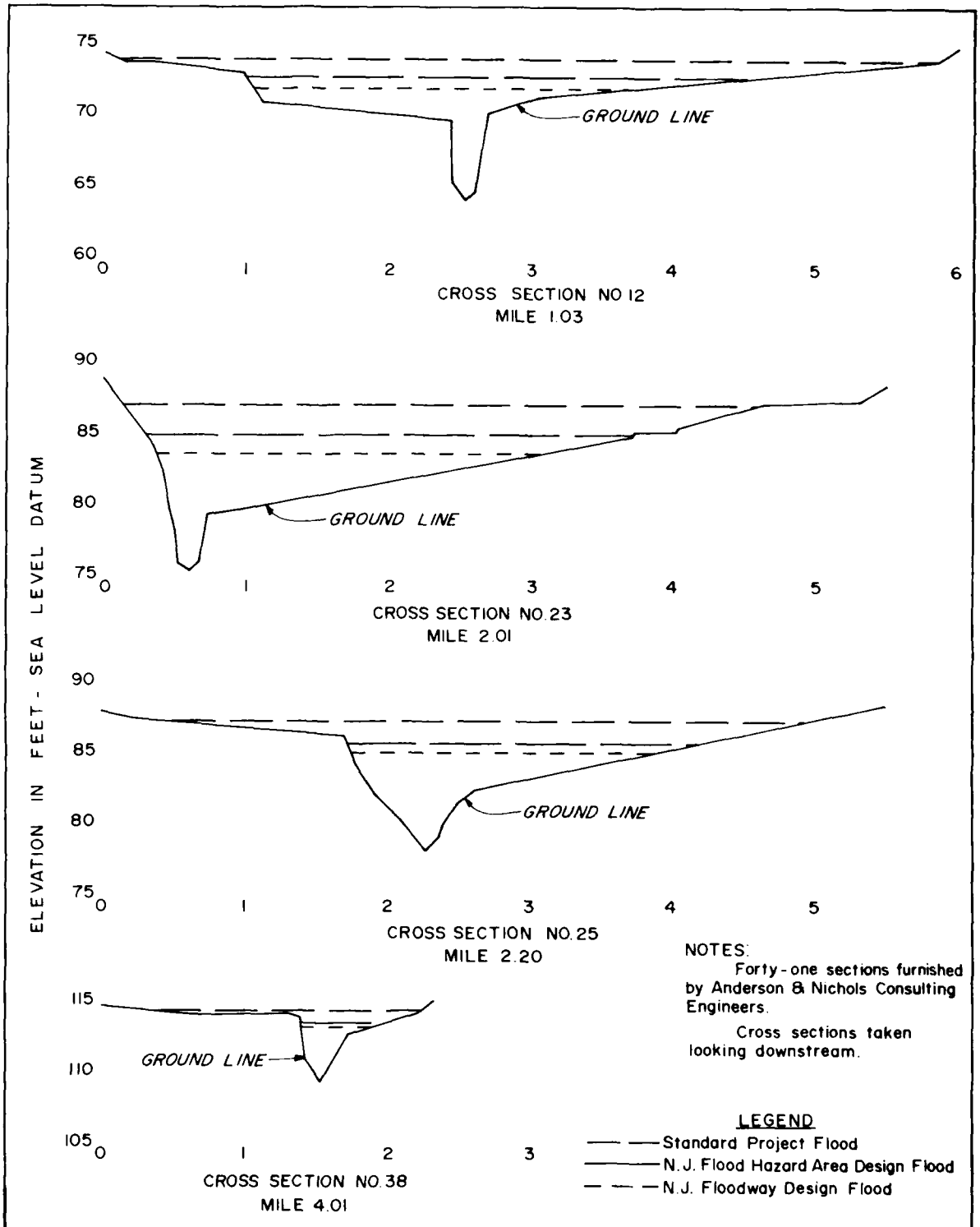
— — — N.J. Floodway Design Flood

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

FLOOD PLAIN INFORMATION
SHABAKUNK CREEK
MERCER COUNTY, N.J

SELECTED CROSS SECTIONS
SHABAKUNK CREEK

PLATE 31



NOTES:

Forty-one sections furnished by Anderson & Nichols Consulting Engineers.

Cross sections taken looking downstream.

LEGEND

— — Standard Project Flood

——— N.J. Flood Hazard Area Design Flood

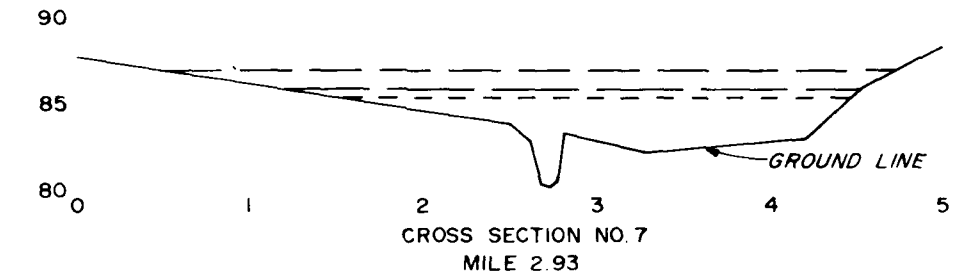
— — — N.J. Floodway Design Flood

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

FLOOD PLAIN INFORMATION
SHABAKUNK CREEK
MERCER COUNTY, N.J.

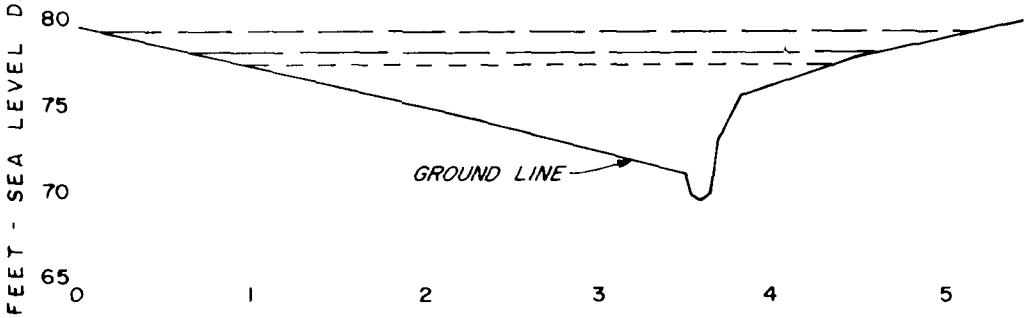
SELECTED CROSS SECTIONS
WEST BRANCH SHABAKUNK CREEK

PLATE 32



CROSS SECTION NO. 7
MILE 2.93

ELEVATION IN FEET - SEA LEVEL DATUM

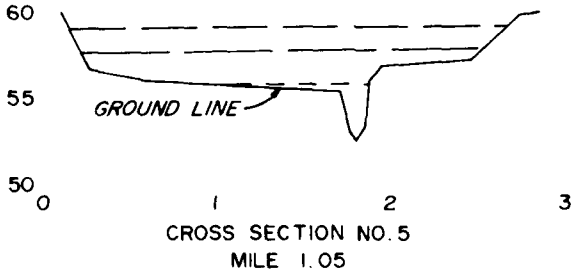


CROSS SECTION NO. 6
MILE 2.03

NOTES:

Eight sections surveyed by Philadelphia District, Corps of Engineers Personnel.

Cross sections taken looking downstream.



CROSS SECTION NO. 5
MILE 1.05

LEGEND

— — Standard Project Flood

——— N.J. Flood Hazard Area Design Flood

— — — N.J. Floodway Design Flood

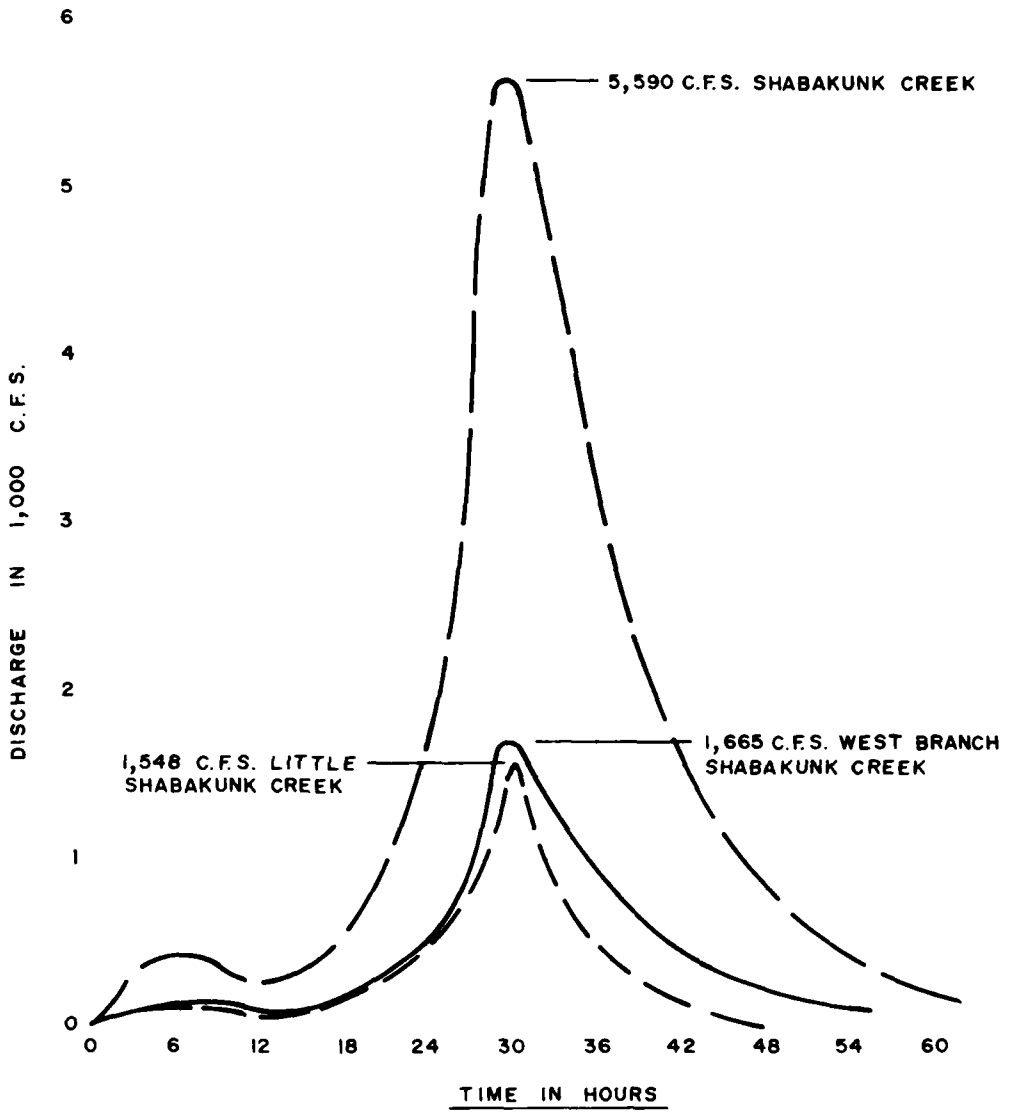
HORIZONTAL DISTANCE IN HUNDREDS OF FEET

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

FLOOD PLAIN INFORMATION
SHABAKUNK CREEK
MERCER COUNTY, N.J.

SELECTED CROSS SECTIONS
LITTLE SHABAKUNK CREEK

PLATE 33



NOTES

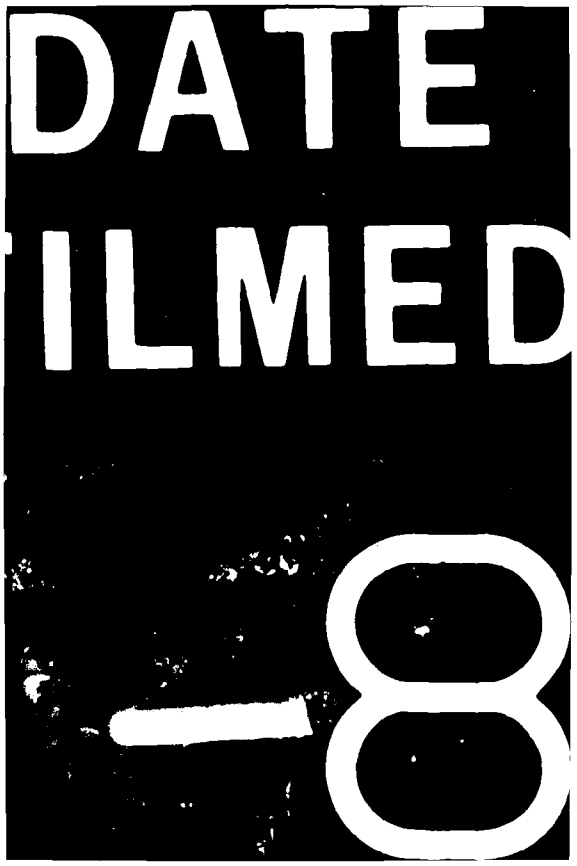
DRAINAGE AREA	SQ. MI.
SHABAKUNK CREEK- DOWNSTREAM OF CONFLUENCE WITH WEST BRANCH	10.8
WEST BRANCH SHABAKUNK CREEK- AT PENNINGTON AVENUE	3.3
LITTLE SHABAKUNK CREEK- DOWNSTREAM OF LAWRENCEVILLE ROAD	2.2

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

FLOOD PLAIN INFORMATION
SHABAKUNK CREEK
MERCER COUNTY, N.J.

STANDARD PROJECT FLOOD HYDROGRAPHS

PLATE 34


DATE
ILMED
8